2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 Introduction

GMMC currently operates the Glamis Marigold Mine under the existing PoO No. N26-88-005P/N-65034, amended July 3, 1997, May 27, 1998, August 6, 1998, September 19, 2001, and March 2002; Reclamation Permit No. 0108; and Water Pollution Control Permit NEV88040. GMMC proposes to expand the current mining operation, develop new facilities, and modify the closure of heap leach facilities at the Glamis Marigold Mine.

GMMC submitted a modification to the existing PoO describing the Millennium Expansion Project. In preparing the PoO Modification, GMMC attempted to minimize environmental impacts by the placement and configuration of facilities, limiting surface disturbance, and incorporating measures to protect the environment. However, during the scoping process another issue was identified from which alternatives to the Proposed Action have been developed to further reduce potential environmental impacts. The issue identified was the long-term stability of the existing Trout Creek Diversion as a result of the proposed deepening of the Red Rock Pit. Consequently, this SEIS analyzes and compares the impacts of the Proposed Action, Alternative 1 that addresses the Realignment of the Trout Creek Diversion, Alternative 2 that addresses the highwall stability of the Red Rock Pit as it relates to the stability of the Trout Creek Diversion, and the No Action Alternative. The Proposed Action and alternatives are described in detail below.

2.2 Proposed Action

The Glamis Marigold Mine has been in commercial operation since 1988 and under the direction of Glamis Marigold Mining Company since 1999. The mine is located on the northwestern flank of Battle Mountain approximately three miles south of the town of Valmy, Nevada, at elevations ranging between 4,600 and 5,900 feet above mean sea level (amsl) (Figure 1-3). The current Project Area includes approximately 8,500 acres of public and private lands within Township 32 North [T32N], Range 43 East [R43E], Section 6, T33N, R43E, Sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 30, and 31; T34N, R43E, Sections 28, 32, and 33.

GMMC owns or controls the majority of mining claims on approximately 8,320 acres of private land and 10,480 acres of public land in the project vicinity (Figure 2-1 and Appendix A). Existing operations (described in Section 1.2) comprise approximately 1,831 disturbance acres, of which approximately 747 acres are located on public land administered by the BLM, and approximately 1,084 acres are on private land (see Table 2-1). There is no State of Nevada-administered property within the Project Area of operations. However, there is private land owned by the University of Nevada, Reno, a state institution. Surface disturbance of that land is included in the private land category.

The proposed Millennium Expansion Project would disturb approximately 667 acres of private land and 807 acres of BLM-administered public land, for a total additional surface disturbance of 1,474 acres (see Table 2-1). The Proposed Action would include expansion and consolidation of the Top Zone and Red Rock pits into the Terry Zone Pit; development of five new mining areas; expansion of the Old Marigold Waste Rock Storage Area; development of three new waste rock storage areas (North, South, and West Waste Rock Storage Areas); development of two new heap leach processing areas (Section 30 Heap Leach Facility and Section 16 Heap Leach Facility); expansion of the existing heap leach pad and processing facilities; development of the Millennium Project ADR Facility; development of new support facilities in Section 31; development of ancillary facilities (infill disturbance, storm water control structures, fencing, power transmission system, substations, water supply system, interior haul and access roads, lime silo, explosives storage, and materials storage area); and modification of the heap closure measures for the proposed new heap leach

facilities and existing heap leach facilities. The Proposed Action would extend the mine operations a maximum of six years through 2013.

A summary of the existing and proposed surface disturbance is presented in Table 2-1. The layout of the existing facilities is illustrated in Figure 1-3 and the layout of proposed facilities is illustrated in Figure 2-2.

2.2.1 Work Force and Schedule

The Proposed Action would extend the life of the mine through the year 2013, with reclamation extending approximately five years beyond active mining operations. A construction work force of 30 or fewer would be employed during construction of expanded facilities (e.g., additional carbon columns, heap leach pads and solution ponds, diversion ditches, truck shop warehouse, and fences). The construction payroll is estimated to be up to $600,000 annually during the construction phases of the project. It is anticipated that the construction work force would be hired from the local areas. The Glamis Marigold Mine currently has approximately 115 employees. This number is not expected to exceed peak employment of 125 during mining operations through 2013. The average annual operations payroll between 2003 and 2013 would be approximately $6.0 million. A conceptual schedule showing possible sequencing of principal pre-development, construction, operation, and reclamation activities is presented in Figure 2-3.

2.2.2 Mining Operations

2.2.2.1 Open Pit Development

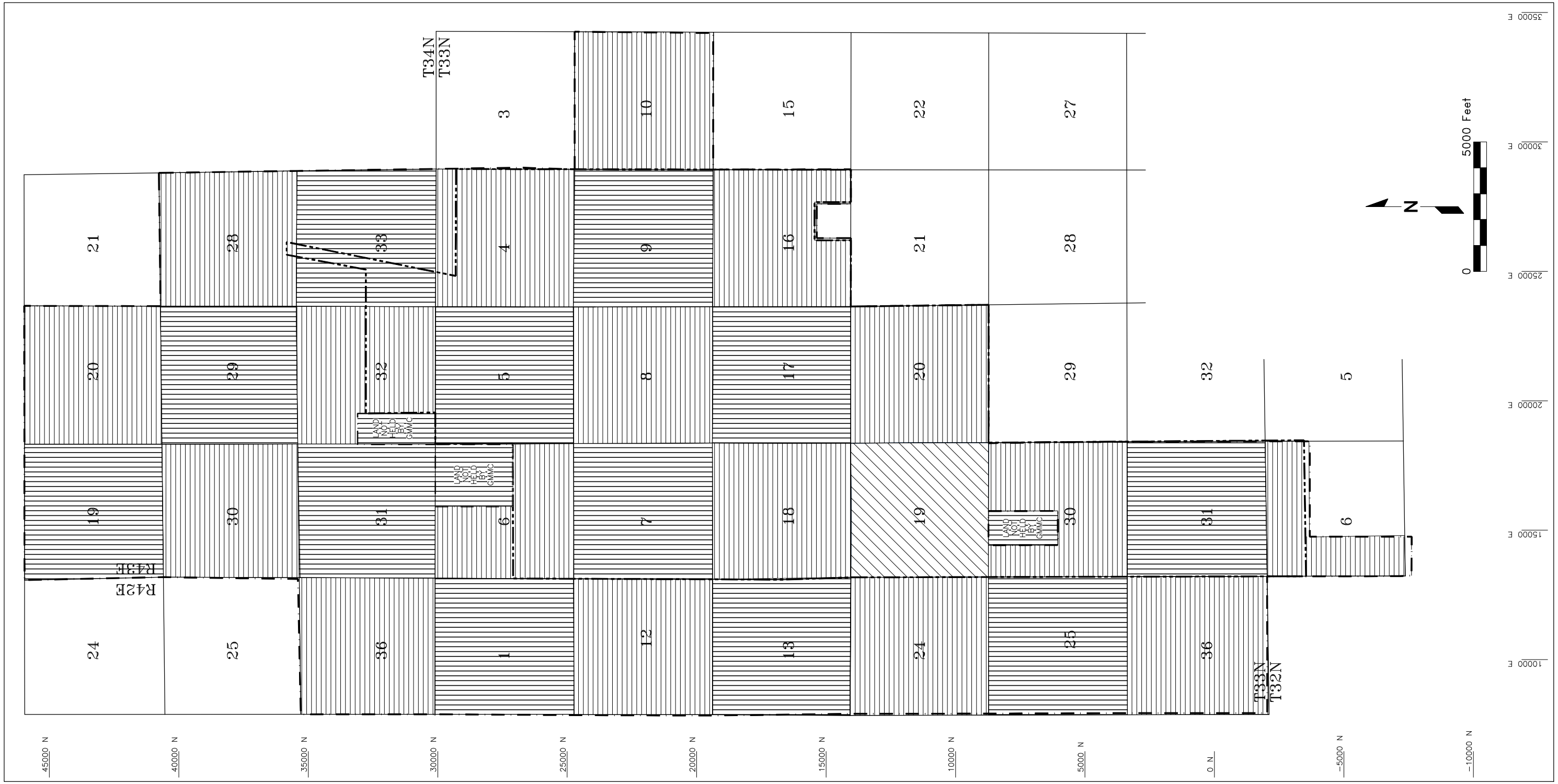
Open Pits

The Proposed Action involves deepening the Top Zone and Red Rock Pits into a consolidated pit called the “Terry Zone Pit” and the development of five new mining areas: Target No. 1 Pit, Target No. 2 Pit, Antler Pit, Basalt Pit, and Mackay Pit. Figure 2-2 shows the locations of these mining areas. Table 2-2 shows the size, land status, generalized pit bottom elevations, and amount of ore proposed to be produced from each pit. The Proposed Action open-pit mining areas would create a combined total of 414 acres of new surface disturbance (164 acres of public land and 250 acres of private land), and would produce approximately 80.6 million tons of ore and 244.0 million tons of waste rock.

The drilling, blasting, and mining procedures currently being used at the Glamis Marigold Mine would be used to develop the pit areas for the Proposed Action. Unconsolidated gravels and growth media that do not require drilling and blasting would be ripped with a dozer, as required, for removal. Ore and waste rock would be drilled on approximately 14-foot centers using diesel-powered rotary hammer drills. The drill holes would be charged with an ammonium nitrate/fuel oil (ANFO) mixture by means of a truck-mounted mixing and dispensing unit. Blasting would occur during daylight hours and would comply with applicable safety standards. Typically, two blasts would occur daily at mid-day and in the late afternoon.

Material would be mined on 20- to 40-foot benches. Mining equipment may include electric or diesel shovels, Cat 16G Motor Graders, D9 or D10 dozers, 85-ton and 190-ton haul trucks, loaders, blast hole drills, water trucks, service trucks, tire trucks, and supply delivery trucks. The slope angles in the open pits would range from 34 to 55 degrees depending on the pit and specific locations within the pit.

Mining associated with the Proposed Action would commence in 2003 and continue through 2013, and would be sequential to enable backfilling of the Target No. 1 Pit and Target No. 2 Pit. Mining would occur first in the Terry Zone Pit, the Mackay Pit, Target No. 1 Pit and Target No. 2 Pit, followed by the Basalt Pit, and finally the Antler Pit. Mining activities may occur on 24-hour, 7-days per week basis, with two to three shifts. No groundwater issues due to potential pit lakes are anticipated for the Proposed Action mining areas because the planned pit bottom elevations for all of the Millennium Expansion Project pits would be at or above the water table except for the Terry Zone Pit. Figure 2-4 presents cross sections showing the expected pit bottom elevations and the depth to groundwater.



Millennium Expansion Project

Figure 2-1

Surface Land Status

Table 2-1: Glamis Marigold Mine Authorized and Proposed Millennium Expansion Project Facilities

Project Component	Previously Authorized Surface Disturbance (acres)		Millennium Expansion Project Proposed Surface Disturbance (acres)		Grand Total (acres)
	Public Land	Private Land	Public Land	Private Land	
Open Pit Mines					
8-South Pit	110	14	0	0	124
East Hill Pit	55	90	0	0	145
Top Zone Pit	65	34	see Terry Zone	see Terry Zone	99
Red Rock Pit	21	44	see Terry Zone	see Terry Zone	65
Old Marigold Pit	24	0	0	0	24
5-North Pit	0	29	0		29
8-North Pit	49	0	0	0	49
Terry Zone Pit Consolidation (Top Zone & Red Rock Deepening)	N/A	N/A	0	0	0
Section 30 - Target 1	N/A	N/A	19	0	19
Section 30 - Target 2	N/A	N/A	90	35	125
Section 31 - Antler Pit	N/A	N/A	34	43	77
Section 31 - Basalt Pit	N/A	N/A	21	153	174
Mackay Pit	N/A	N/A	0	19	19
Total Pits	324	211	164	250	949
Waste Rock Storage Areas					
8-South[(1)]	30	0	0	0	30
Top Zone	80	55	0	0	135
Old Marigold	73	23	9	7	112
Resort	10	163	0	0	173
5-North	0	55	0	0	55
North Storage Area	N/A	N/A	155	133	288
South Storage Area	N/A	N/A	53	0	53
West Storage Area	N/A	N/A	11	133	144
Total Waste Rock Areas	193	296	228	273	990
Heap Leach Facilities					
Heap Leach Pads No. 1 - 10	56	74	0	0	130
Process Ponds	5	0	0	0	5
Storm water Ponds	1.5	1.5	0	0	3
SW Pad Expansion[(2)] (Cell 11)	0	60	0	0	60
Process Ponds	0	0	0	0	0
Storm water Ponds	0	2	0	0	2
5-North Heap Leach Pad	0	30	0	0	30
Process Ponds	0	2	0	0	2
Storm water Ponds	0	1	0	0	1
Plant Facilities	0	1	0	0	1
Section 17 Heap Leach Pad (Cell 12)	0	0	78	0	78
Solution Conveyance Ditch	0	0	0	2	2
Process Ponds[(3)]	0	0	0	0	0
Storm water Pond[(3)]	0	0	0	0	0

Project Component	Previously Authorized Surface Disturbance (acres)		Millennium Expansion Project Proposed Surface Disturbance (acres)		Grand Total (acres)
	Public Land	Private Land	Public Land	Private Land	
Carbon columns & storage tanks[3]	0	0	0	0	0
Section 30 Heap Leach Pad	N/A	N/A	125	30	155
Process Ponds	N/A	N/A	14	2	16
Storm water Pond (freeboard on Process Ponds)	N/A	N/A	0	0	0
ADR, lime silo, & infill (includes fresh water pond)	N/A	N/A	24	0	24
Section 16 Heap Leach Pad	N/A	N/A	76	0	76
Process Ponds	N/A	N/A	2	0	2
Storm water Pond	N/A	N/A	1	0	1
Carbon columns & storage tanks	N/A	N/A	1	0	1
Total Heap Leach	62.5	171.5	321	34	589
Plant and Support Facilities New Support Facility					
Existing Mill and Plant Facilities	35	17	0	0	52
New truck shop, warehouse, fuel dispensing	N/A	N/A	0	7	7
Total Plant and Support Facilities	35	17	0	7	59
Tailings Disposal Facilities					
Existing Tailings Facility	0	234	0	0	234
New Tailings Facility	N/A	N/A	0	0	0
Total Tailings	0	234	0	0	234
Growth Media Stockpiles					
Pre-FEIS	5	15	0	0	20
5-North (2 stockpiles)	0	10	0	0	10
8-North	5	0	0	0	5
New Tailings	0	8	0	0	8
SW Heap Leach Pad	0	5	0	0	5
Section 19	N/A	N/A	0	5	5
Section 16	N/A	N/A	5	0	5
Total Growth Media	10	38	5	5	58
Surface Water Diversion Structures					
Heap Leach - Old Tailings	0.1	2.9	0	0	3
5-North/Cottonwood Creek	4	6	0	0	10
8-North/Trout Creek	5	3	0	0	8
SW Heap Leach	5	8	0	0	13
New storm water diversion structures[4]	N/A	N/A	0	0	0
Total Diversion Structures	14.1	19.9	0	0	34
Haul and Access Roads					
Pre-FEIS Haul Roads	22	38	N/A	N/A	60
5 North	14	14	0	0	28
Millennium Expansion Project	N/A	N/A	27	25	52

Project Component	Previously Authorized Surface Disturbance (acres)		Millennium Expansion Project Proposed Surface Disturbance (acres)		Grand Total (acres)
	Public Land	Private Land	Public Land	Private Land	
Haul and Access Roads					
Total Haul and Access Roads	36	52	27	25	140
Water Supply Facilities					
Pre-FEIS Water Supply	4	5	N/A	N/A	9
Lone Tree Water Line	0.1	3.9	N/A	N/A	4
Millennium Expansion Project Water Supply	N/A	N/A	11	10	21
Total Water Supply	4.1	8.9	11	10	34
Infill Surface Disturbance					
Infill Areas[(2)]	50	10	0	0	60
Millennium Expansion Project Infill Areas	N/A	N/A	51	63	114
Total Infill Disturbance Areas	50	10	51	63	174
Miscellaneous Ancillary					
Miscellaneous and Ancillary Facilities	1.5	0.5	N/A	N/A	2
Millennium Expansion Project Miscellaneous and Ancillary Facilities	N/A	N/A	0	0	0
Total Ancillary Facilities	1.5	0.5	0	0	2
Surface Exploration					
Drill roads, pads, trenches	17	25	N/A	N/A	42
Millennium Expansion Project Surface Exploration	N/A	N/A	0	0	0
Total Surface Exploration	17	25	0	0	42
Authorized Disturbance Grand Totals	747.2	1,083.9	N/A	N/A	**1,831.1**
Millennium Expansion Project Proposed Disturbance Total	N/A	N/A	807	667	**1,474**
AUTHORIZED AND PROPOSED CUMULATIVE TOTAL					**3,305.1**

Notes: [(1)]The total authorized disturbance does not include the 150 acres of reclaimed and recently released acres at the 8-South Waste Rock Storage Area.

[(2)]The acres shown for previously authorized disturbance for the Southwest Leach Pad and the infill areas reflect the changes authorized in the March 2002 Minor Modification DNA to eliminate 12 acres of disturbance on private land from the authorized infill disturbance, and to reconfigure the layout of the Southwest Heap Leach Pad to cover an additional 12 acres of private land.

[(3)]The acres for the modification of the Process Facilities for the Section 17 Heap Leach Pad are accounted for in previously authorized disturbance for the existing heap leach facilities and in fill areas.

[(4)]Surface disturbance for Millennium Expansion Project storm water diversion structures is accounted for in the acres shown for the Millennium Expansion Project pits and waste rock storage facilities.

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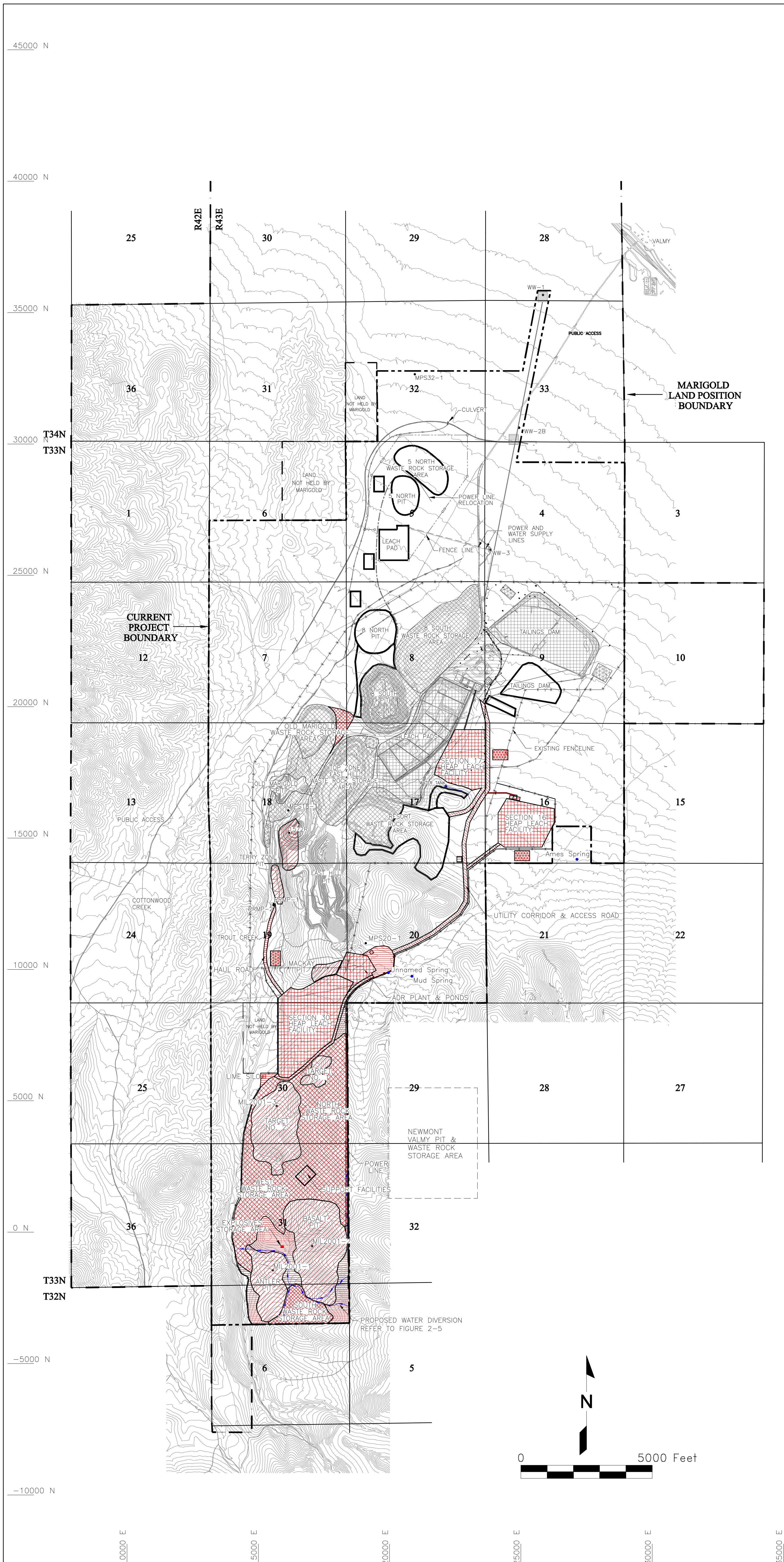
LEGEND

- WASTE ROCK STORAGE AREA
- MINE PIT
- GROWTH MEDIA STOCKPILE
- PROCESS FACILITY
- FACILITY, HAUL ROAD, "INFILL" AREA, ETC.
- SURFACE WATER DIVERSION
- PRIVATE LAND/PUBLIC LAND CLAIM BOUNDARY
- EXISTING PERMIT BOUNDARY
- AUTHORIZED BUT NOT YET CONSTRUCTED
- AREAS WITH THE LIGHTER SHADE HATCHING REPRESENT COMPONENTS THAT ARE CURRENTLY CONSTRUCTED.



Millennium Expansion Project

Figure 2-2
Proposed Action

Glamis Marigold Mining Company
Millennium Expansion Project

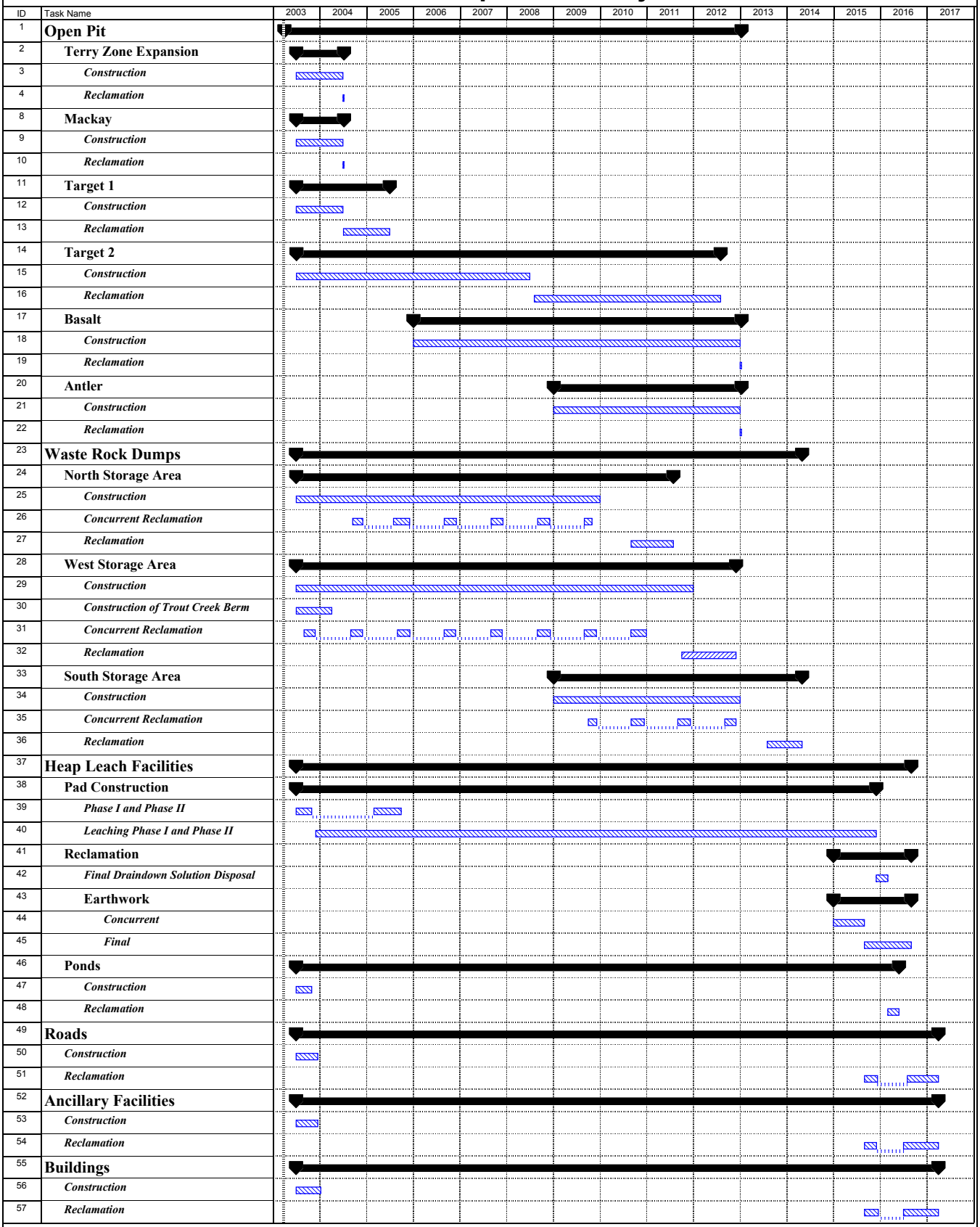


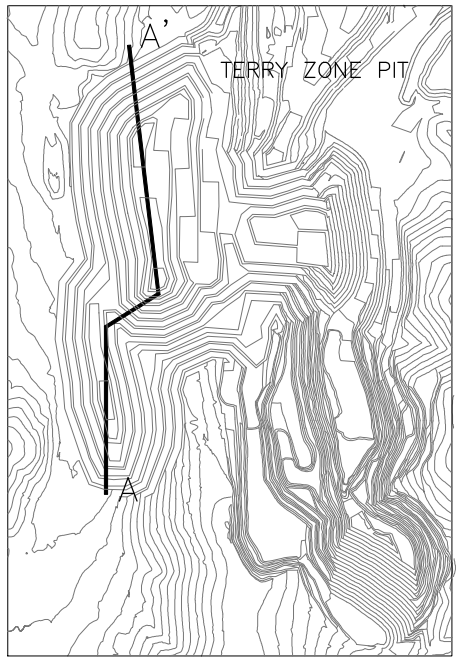
Figure 2-3
Millennium Expansion Project Schedule

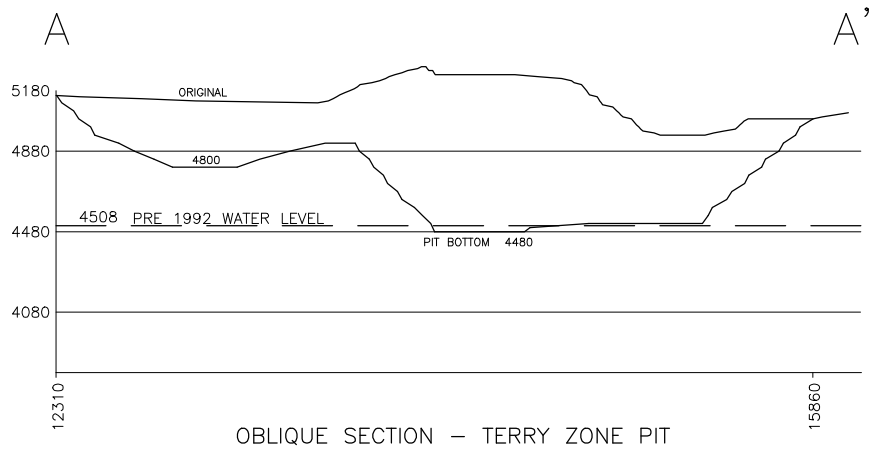
Table 2-2: Millennium Expansion Proposed Open Pit Development

Pit Name	New Surface Disturbance (acres)		Pit Dimensions (ft)	Pit Bottom Elevation (ft - amsl)	Water Table Elevation (ft - amsl)		Tons Produced		Leach Pad and Waste Rock Storage Area Destinations	
	Public	Private			During Mining	Post Mining	Ore	Waste	Ore	Waste
Terry Zone Pit	0	0	3,800 - long 2,200 - wide 1,000 - deep	4,480	4,341	~4,508	7,197,200	14,231,100	existing & Section 30 heap	Old Marigold Area
Section 30										
Target No. 1	19	0	1,500 - long 500 - wide 200 - deep	5,300	~4,784	~4,814	1,666,100	1,793,600	Sections 30 & 16 heaps	North Area
Target No. 2	90	35	3,400 - long 1,800 - wide 480 - deep	5,020	~4,784	~4,814	21,602,100	83,123,600	Sections 30 & 16 heaps	North Area
Section 31										
Antler Pit	34	43	2,625 - long 1,380 - wide 600 - deep	5,180	~5,049	~5,079	11,950,600	35,159,800	Sections 30 & 16 heaps	North, South and West Areas
Basalt Pit	21	153	3,975 - long 1,925 - wide 840 - deep	5,220	5,046	~5,076	37,386,600	107,273,100	Sections 30 & 16 heaps	North, South and West Areas
Mackay Pit	0	19	1,275 - long 980 - wide 200 - deep	5,100	~4,330	~4,667	765,400	2,461,500	Sections 30 & 16 heaps	North Area
Grand Totals	164	250					80,568,000	244,042,700		

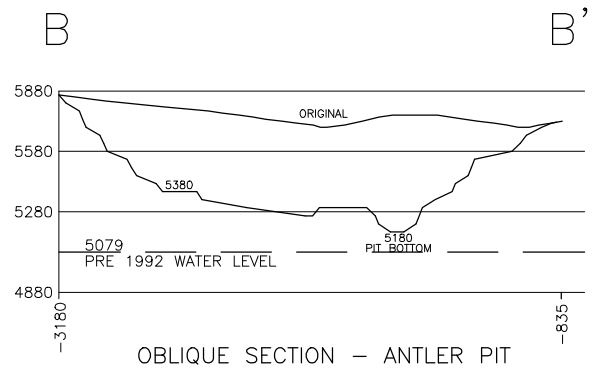
Note: Consolidating the Red Rock and Top Zone pits into the Terry Zone Pit will involve deepening the existing pits. The footprint of the rim of the pit will coincide with the authorized footprint for these pits. Thus no new surface disturbance will be created in conjunction with development of the Terry Zone Pit. The pit dimensions are approximate; the pit acres are calculated by neat line and represent actual disturbance.

The generalized pit bottom elevations shown above represent approximate average elevations. As mining occurs, the actual pit bottoms may change slightly, with local pit bottom elevations varying from the estimate. These minor variations would accommodate site-operating specifics and would not change the surface disturbance for the pits or the waste rock storage areas shown above.





OBLIQUE SECTION – TERRY ZONE PIT
LOOKING WEST
NOT TO SCALE



OBLIQUE SECTION – ANTLER PIT
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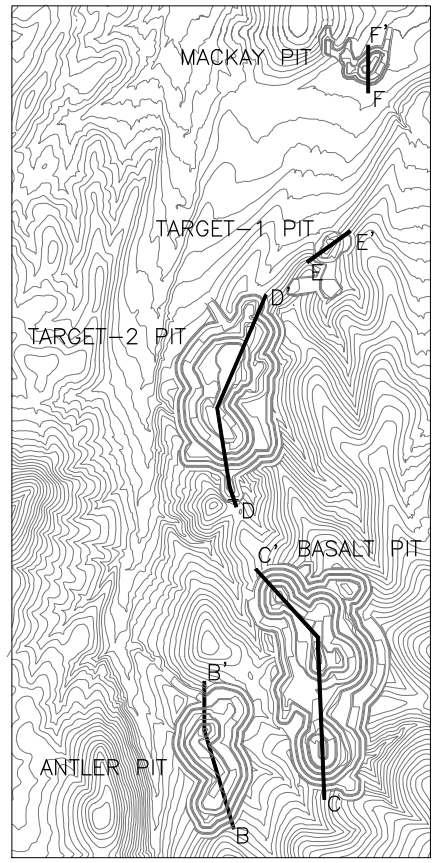

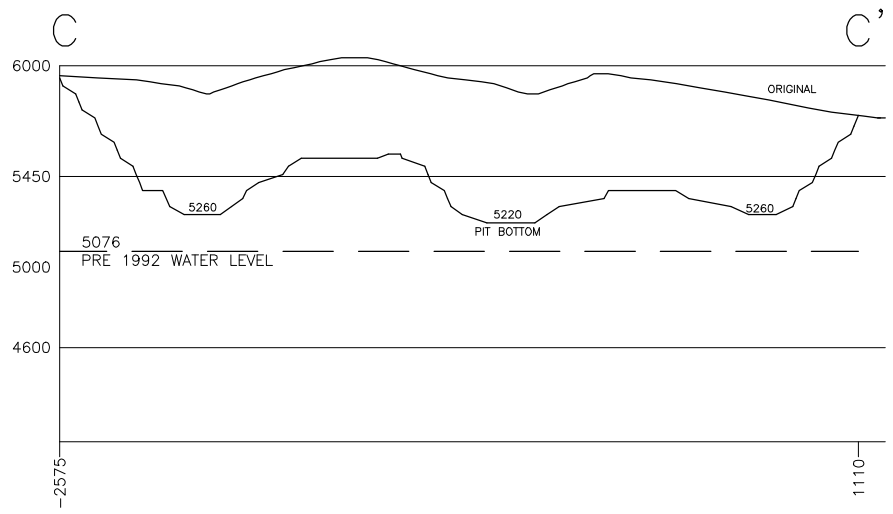

OBLIQUE SECTION – BASALT PIT
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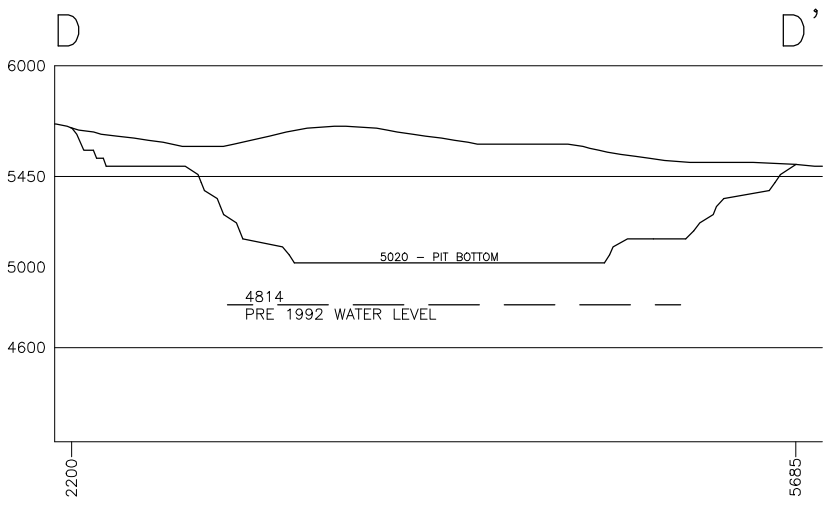

OBLIQUE SECTION – TARGET-2 PIT
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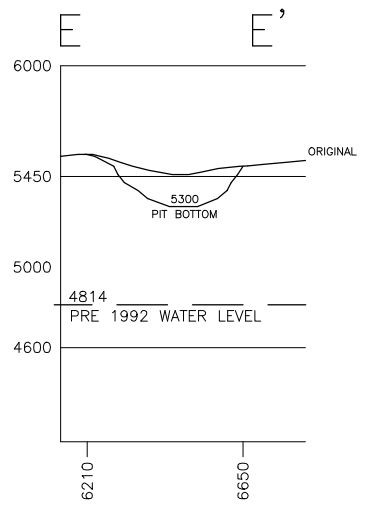

OBLIQUE SECTION – TARGET-1 PIT
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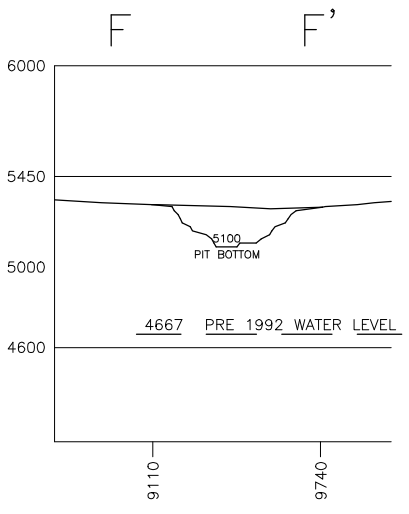


OBLIQUE SECTION – MACKAY PIT
LOOKING WEST
NOT TO SCALE

Millennium Expansion Project

Figure 2-4

Pit Depths and Depth to Groundwater Cross Sections

The generalized pit bottom elevations shown in Table 2-2 and discussed below represent approximate average elevations. As mining occurs, the actual pit bottoms may change slightly, with local pit bottom elevations varying from the estimate. These minor variations would accommodate site-operating specifics and would not change the surface disturbance for the pits or the waste rock storage areas shown in Table 2-1 and Table 2-2. However, with the exception of the Terry Zone Pit, these minor variations would not extend the pit bottom elevation below the known or projected pre-Lone Tree dewatering groundwater level. The details associated with each pit are provided below.

Terry Zone Pit

Deepening and combining portions of the existing Top Zone and Red Rock open pits would create one large pit, hereafter called the Terry Zone Pit. Mining would commence in 2003. The Terry Zone Pit would not expand the existing approved surface disturbance foot print, but would be deeper than the pit bottom elevations currently authorized for the Top Zone and Red Rock Pits. The deepest planned bottom elevation of the Terry Zone Pit would be approximately 4,480 amsl, approximately 28 feet below the estimated pre-dewatering groundwater level (WMC 2002). The currently authorized deepest pit bottom elevation for this mining area is 4,740 feet amsl.

Deepening of the Terry Zone Pit to below the previously approved depth of the Top Zone and Red Rock Pits would produce an additional 7,197,200 tons of ore and 14,231,100 tons of waste rock. This ore may be processed at the existing heap leach facility, the expanded Section 17 Heap Leach Facility, or the proposed Millennium Expansion Project Section 30 Heap Leach Facility. If the ore is milled, the tailings would be stored in the authorized, but not yet constructed, tailings facility. Waste rock generated from the Terry Zone Pit is scheduled for disposal at the Old Marigold Waste Rock Storage Area (Table 2-2).

Target No. 1 Pit

Mining of the Target No. 1 Pit would produce approximately 1,666,100 tons of ore and 1,793,600 tons of waste rock. Ore would be processed at the Section 30 and Section 16 Heap Leach Facilities, or the expanded Section 17 Heap Leach Facility. Waste rock would be disposed at the North Waste Rock Storage Area.

This pit would disturb about 19 acres of public land and would be approximately 1,500 feet long, 500 feet wide, and 200 feet deep, with a planned bottom elevation of approximately 5,300 amsl.

Upon completion of mining, this pit would be completely backfilled with approximately 3,000,000 tons of waste rock from the Target No. 2 Pit. Current plans have mining of the Target No. 1 Pit starting in 2003 or as soon as all project permits and approvals have been acquired and would continue for approximately one year.

Target No. 2 Pit

Mining of the Target No. 2 Pit would produce approximately 21,602,100 tons of ore and 83,123,600 tons of waste rock. Ore from this pit would be processed at the Section 30 and Section 16 Heap Leach Facilities or the expanded Section 17 Heap Leach Facility. The waste rock from this pit would be used to backfill Target No. 1 Pit. Once Target No. 1 Pit is completely backfilled, the additional waste rock would be placed above ground as part of the North Waste Rock Storage Area.

This pit would disturb about 125 acres (90 acres of public land and 35 acres of private land). Target No. 2 Pit would be approximately 3,400 feet long, 1,800 feet wide, and 480 feet deep, with a planned bottom elevation of about 5,020 amsl.

This pit would be completely backfilled upon completion of mining with approximately 81,000,000 tons of waste rock obtained from the mining of the Basalt Pit. Mining of the Target No. 2 Pit would begin in 2003 or as soon as all project permits and approvals have been acquired and would continue for approximately five years.

Antler Pit

Mining of the Antler Pit would produce approximately 11,950,600 tons of ore and 35,159,800 tons of waste rock. Ore would be processed at the Section 30 and Section 16 Heap Leach Facilities and waste rock

would be disposed at the North, South, and West waste rock storage areas.

This pit would disturb about 77 acres (34 acres of public land and 43 acres of private land) and would be approximately 2,625 feet long, 1,380 feet wide, and 600 feet deep, with a planned bottom elevation of approximately 5,180 amsl. Mining of the Antler Pit is scheduled to begin in the year 2009 and continue for approximately four years.

Basalt Pit

Mining of the Basalt Pit would produce approximately 37,386,600 tons of ore and 107,273,100 tons of waste rock. The ore from this pit would be processed at the Section 30 and Section 16 Heap Leach Facilities. The North, South, and West waste rock storage areas would be used for waste rock from the Basalt Pit.

This pit would disturb about 174 acres (21 acres of public land and 153 acres of private land) and would be approximately 3,975 feet long, 1,925 feet wide, and 840 feet deep, with a planned bottom elevation of approximately 5,220 amsl. Mining of the Basalt Pit is scheduled to begin in the year 2006 and continue for approximately seven years.

Mackay Pit

Mining of the Mackay Pit would produce approximately 765,400 tons of ore and 2,461,500 tons of waste rock. Ore would be processed at the Section 30 and Section 16 Heap Leach Facilities. Waste rock would be disposed of at the North Waste Rock Storage Area.

This pit would disturb about 19 acres of private land (owned by the University of Nevada-Reno), and would be approximately 1,275 feet long, 980 feet wide, and 200 feet deep, with a planned bottom elevation of approximately 5,100 amsl. Mining is scheduled to begin in the Mackay Pit in 2003, or as soon as all project permits and approvals have been acquired, and would be completed within one year. Mining of the Mackay Pit would be concurrent with mining of the Terry Zone Pit.

2.2.2.2 Loading and Hauling

Blasted ore and waste rock would be loaded by hydraulic loader onto 85- to 190-ton capacity haul trucks. The haul trucks would transport the mined material to the heap leach facilities and waste rock storage areas, as applicable.

2.2.3 Waste Rock Disposal

2.2.3.1 Waste Rock Storage Areas

The expanded and new waste rock storage areas would cover 501 acres (228 acres of public land and 273 acres of private land) as shown in Figure 2-2. The waste rock storage areas developed in conjunction with the Proposed Action would be constructed in the same manner as previously authorized waste rock storage areas. After stripping and stockpiling the growth media from the site, the waste rock storage area would be created by end dumping waste rock material onto the active bench face of the storage area at the angle of repose. The waste rock storage areas would be built at an overall slope of 3H:1V[1], with average bench heights of 50 to 60-feet. Table 2-3 shows the size, land status, height and amount of waste rock to be stored in each waste rock storage area.

Development of these waste rock storage areas would be timed to optimize operational flexibility, and to provide the base for the access road from the Section 30 Heap Leach Facility and new shop and maintenance area, to the Basalt and Antler Pits in the southern portion of the Project Area. This road would be relocated periodically to facilitate waste rock storage area development. Land status, approximate dimensions, and storage capacities of the proposed waste rock storage areas are described in Table 2-3.

[1] The slope of each individual bench would be angle of repose. However, by using 50- to 60-foot bench heights and setbacks of 150 - 180 feet, the overall slope from bench crest to bench crest would be 3H:1V. This type of construction facilitates achievement of the final reclaimed slopes at 3H:1V.

Table 2-3: Millennium Expansion Waste Rock Storage Areas

Waste Rock Storage Facility	New Surface Disturbance (acres)		Storage area/Backfill Capacity (tons)	Storage area Height/ Backfill Thickness (ft)	Waste Rock Source	Stratigraphic Unit[1]
	Public	Private				
Old Marigold Expansion	9	7	5,000,000	100	Terry Zone Pit	Valmy Formation
North Storage Area	155	133	119,000,000	280 to 590	All pits except Terry Zone Pit	Valmy Formation, Havallah Formation, and Antler Sequence
West Storage Area	11	133	31,000,000	310	All pits except Terry Zone Pit	Valmy Formation, Havallah Formation, and Antler Sequence
South Storage Area	53	0	5,000,000	200	All pits except Terry Zone Pit	Valmy Formation, Havallah Formation, and Antler Sequence
Target No. 1 Pit Backfill	n/a	n/a	3,000,000	200	Target No. 2 Pit	Valmy Formation, Havallah Formation, and Antler Sequence
Target No. 2 Pit Backfill	n/a	n/a	81,000,000	480	Basalt or Antler Pit	Valmy Formation, Havallah Formation, and Antler Sequence
Terry Zone Pit Partial Backfill	n/a	n/a	421,730	28	8-North Pit	Havallah Formation, Edna Mountain Formation, Alluvium
Total Acres and Millennium Waste Rock Storage Capacity	228	273	244,000,000			

[1]Valmy Formation consists of interbedded quartzite, sandstone, chert, argillite, and metabasalt; Havallah Formation consists of conglomerate, shale, sandstone, limestone, metavolcanics, chert, and siltstone; Antler Sequence consists of Battle Formation conglomerate, and sandstone with minor shale, Antler Peak Limestone with calcareous conglomerate and sandstone, and Edna Mountain Formation conglomerate, siltstone, sandstone, and very minor limestone.

The Proposed Action includes expansion of the Old Marigold Waste Rock Storage Area and development of three new waste rock storage areas to accommodate the estimated 244 million tons of waste rock that would be mined as a result of the Millennium Expansion Project. This waste rock storage capacity includes 84 million tons that would be backfilled in the Target No. 1 and Target No. 2 pits as shown in Table 2-3 and Figures 2-2 and 2-5.

As shown in Figure 2-2, the Old Marigold Waste Rock Storage Area would be expanded by 16 acres (nine acres of public land and seven acres of private land) to accommodate waste rock mined from the Terry Zone Pit.

Mining of the Millennium Expansion Project Area would entail development of five separate pits as described in Section 2.2.2.1. Pit development would be sequenced to optimize pit backfilling of the Target No. 1 and Target No. 2 pits. The North Waste Rock Storage Area would be created first, receiving waste rocks from the Target No. 1 Pit, followed by waste rocks from the Target No. 2 Pit. Once mined out, the Target No. 1 Pit would be backfilled with waste rocks from the Target No. 2 Pit. The remaining waste rock from the Target No. 2 Pit would expand the North Waste Rock Storage Area. After mining of the Target No. 2 Pit is completed, this pit would be backfilled with material from the Basalt or Antler pits. Following complete backfilling of the Target No. 1 and Target No. 2 pits, the area encompassing the former pits would continue to receive waste rock until the area over and surrounding the former pits is one continuous waste rock storage area. The final configuration of the North Waste Rock Storage Area would occupy 288 acres (155 acres of public land and 133 acres of private land) as shown on Figures 2-2 and 2-5.

2.2.3.2 Pit Backfill

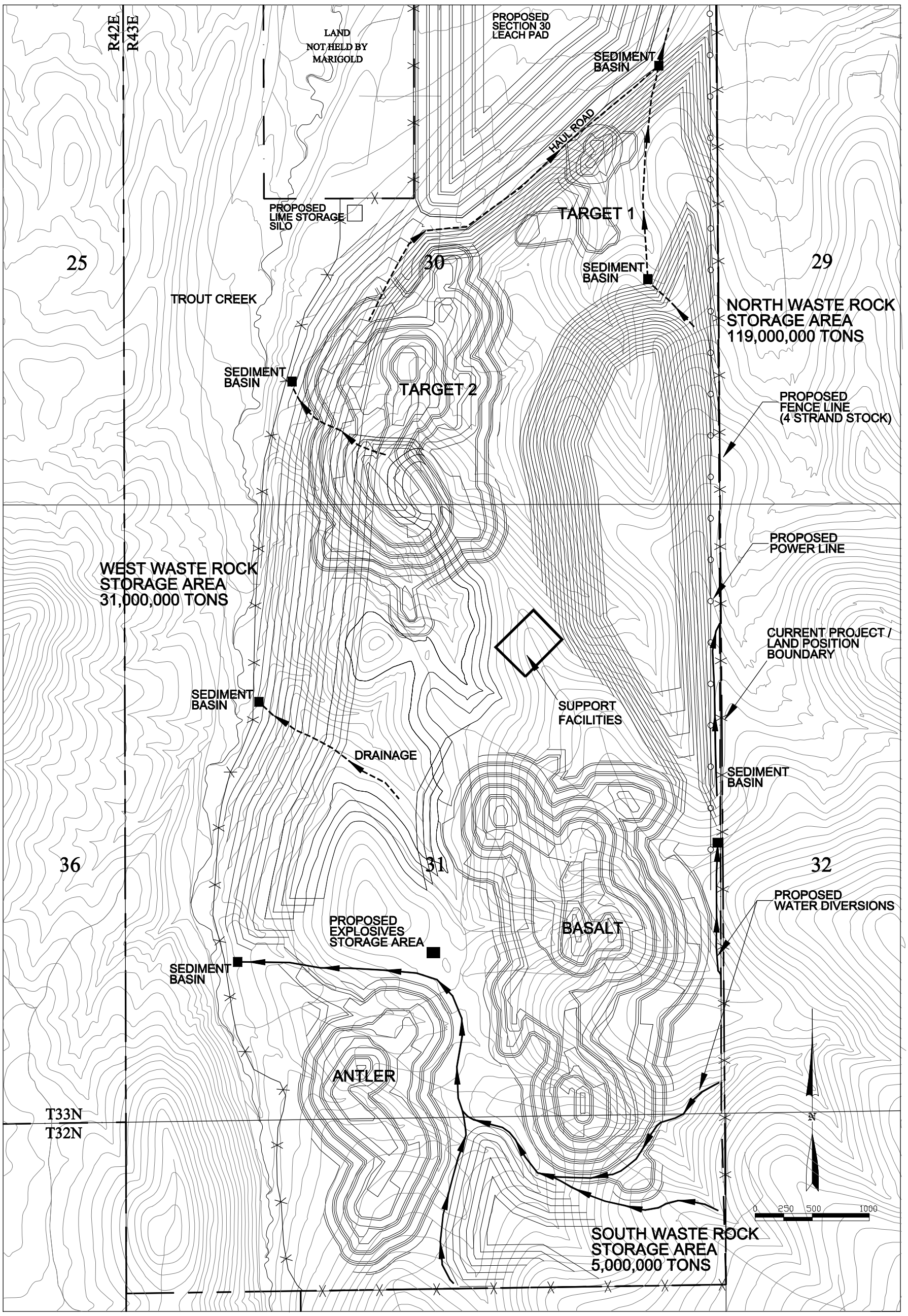
The Proposed Action includes backfilling of the Target No. 1 and Target No. 2 pits as shown in Figure 2-6. The Target No. 1 Pit would be backfilled with about three million tons of waste rock from the Target No. 2 Pit. The Target No. 2 Pit would be backfilled with approximately 81 million tons of suitable waste rock from the Basalt Pit and/or the Antler Pit. This amount of backfilling would be sufficient to completely fill both pits. Additional waste rocks would be placed on top of the backfilled pits to form one continuous waste rock storage area as shown in Figure 2-5.

The Terry Zone Pit is proposed for mining below the projected pre-Lone Tree dewatering groundwater level estimated at 4,508 feet amsl. Therefore, GMMC proposes to partially backfill the Terry Zone Pit to 4,520 feet amsl. Approximately 421,730 tons of waste rock from the 8-North Pit would be used for the Terry Zone Pit partial backfill. In the event that the 8-North Pit is not developed, other sources of suitable backfill material would be identified for use before mining below the pre-Lone Tree Mine dewatering water level.

GMMC would also backfill or partially backfill other pits with suitable waste rock material as the opportunity exists. Under the current mining sequence, the Target 1 and Target 2 pits would be completely backfilled and Terry Zone Pit would be partially backfilled. As changes in mining schedule, mine plan modifications, or other economic changes result in additional opportunities for below surface waste rock disposal, GMMC would contact BLM and NDEP for approval.

Pit backfilling would be contingent upon the conditions that were analyzed in the Glamis Marigold Mine Expansion FEIS (BLM 2001). The FEIS established the following requirement for determining whether a waste rock type is suitable for use as pit backfill (BLM 2001, page 2-15):

> "To ensure that the overburden used to backfill any of the pits does not have the ability to degrade waters of the state, any material to be placed in the pits would be characterized for its potential to generate acid and/or release metals. Testing would include both the Acid Base Accounting (ABA) and Meteoric Water Mobility Procedure (MWMP), and if necessary, kinetic testing. Material determined from these tests to have the potential to generate acid or release metals and non-metals to surface water or groundwater would not be placed in the pits and would be subject to a material management plan, as necessary."



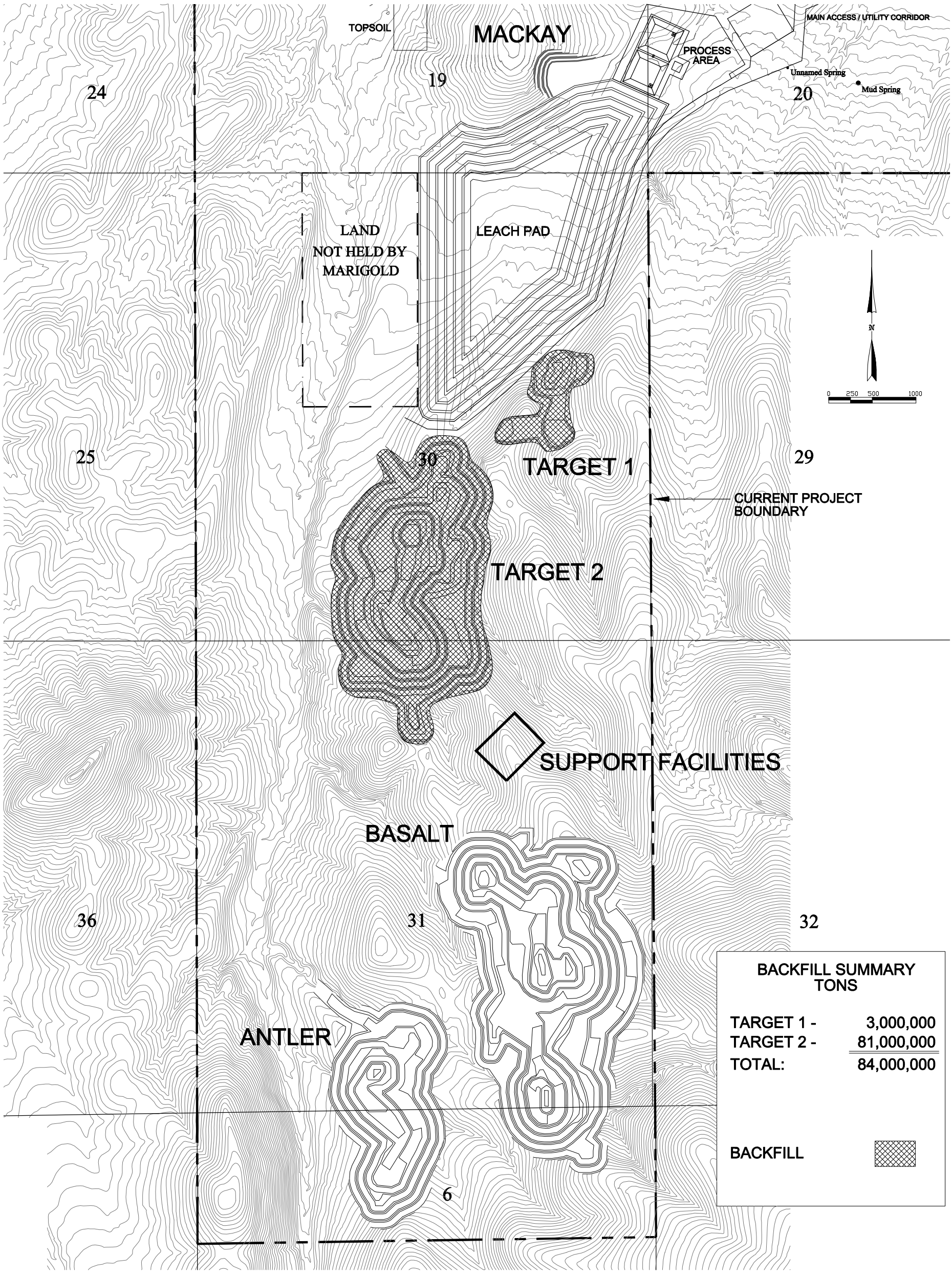
DRAINAGE

DIVERSIONS

Millennium Expansion Project

Figure 2-5

Waste Rock Storage Areas



Millennium Expansion Project

Figure 2-6

Pit Backfilling Map

In response to this requirement, GMMC has submitted additional data to BLM in conjunction with the Millennium Expansion Project to demonstrate that the waste rock material from the expanded and proposed new pits would be suitable for use as backfill material. The additional data consists of waste rock characterization tests performed on a representative suite of waste rock material and infiltration modeling (See Section 3.3, Geochemistry and Water Resources).

As shown in Figure 2-4, the pit bottom elevations of both the Target No. 1 and Target No. 2 pits would be above the known groundwater level. The proposed bottom elevation of the Target No. 1 Pit at 5,300 amsl is approximately 486 feet above the estimated pre-dewatering groundwater elevation (4,784 feet amsl) as determined in a groundwater monitoring well. The proposed bottom elevation of the Target No. 2 Pit at 5,020 amsl would be at least 206 feet above the estimated pre-dewatering groundwater elevation. The monitoring well drilled in the vicinity of the Target No. 2 Pit was dry at 4,780 ft. amsl, the total depth of the well.

Waste rock mined to date at the Glamis Marigold Mine includes Valmy Formation quartzites and shales; the Antler Sequence which is comprised of the Battle Formation siltstones, conglomerates, and breccias, the Antler Peak limestone, and the Edna Mountain Formation siltstones, conglomerates, and breccias; and the Havallah Formation quartzites and cherts (see BLM 2001, Sections 3.1.1 and 3.2). GMMC has performed waste rock characterization tests on the mined waste rock to comply with BLM and Nevada state permit requirements. As described in the FEIS (see BLM 2001, page iii and Sections 3.1.1.1 and 3.1.2.1), the paste pH and ABA tests performed on the Glamis Marigold Mine waste rock indicate this material is not acid generating. The data presented in the FEIS (Appendix B, Table B-2) indicate that the ratio of Acid Neutralizing to Acid Generating material is variable, but generally satisfies BLM's 3:1 criterion for classifying the waste rock as non-acid generating. Additionally, as discussed in Section 3.1.1.1 and Appendix B of the EIS, the pyrite content of the Glamis Marigold Mine waste rock is typically less than 0.5 percent, indicating very low potential to generate acid.

The waste rock generated from the new pits would be comprised of the same suite of rocks, which has been mined to date at the Glamis Marigold Mine. The majority of the waste rock would include the Valmy, Havallah, and Antler formations. Given the waste rock characterization results obtained to date from these lithologies, it is anticipated that the Millennium Expansion Project waste rock material would be similarly non-acid generating. The waste rock characterization baseline for these units in the expanded pits and proposed new pits is provided and discussed in Section 3.3. GMMC conducts regular waste rock monitoring in accordance with the approved *Glamis Marigold Mine Waste Rock Management Plan*. If, during mining of the new pits, the waste monitoring program identifies waste rocks that have the potential to be acid generating, these rocks would not be used as pit backfill and would be managed in accordance with the Glamis Marigold Mine Sulfide Waste Management Plan that BLM approved on May 19, 2000.

GMMC has performed an infiltration study for the heap leach pads, pit backfill, waste rock facilities, and tailings cover materials. These studies consist of infiltration modeling of on-site materials and empirical infiltration data obtained from existing waste rock storage areas, pit walls immediately down gradient from waste rock storage areas, and leached heaps. Information from the waste characterization tests and the infiltration study would be used to identify waste rock and growth media material types that are suitable for use as backfill material and for the ET cover for the existing Marigold, authorized 5-North, and proposed Section 30 and Section 16 heap leach pads.

2.2.4 Heap Leach Facilities

2.2.4.1 Heap Leach Design and Construction

All of the ore extracted under the Proposed Action is anticipated to be processed as run-of-mine heap

leach ore at the existing heap leach facility and the proposed heap leach facilities. None of the ore would be crushed or processed through the existing mill. However, if higher-grade ore is unexpectedly encountered during mining, and processing the higher grade ore through the mill would be advantageous, then as part of the Proposed Action, GMMC would mill that portion of the Millennium Expansion Project ore. The existing mill, and authorized, but as yet not constructed tailings disposal facility, would have ample capacities for this purpose.

The 81 million tons of ore from the Proposed Action would require developing two new heap leach facilities and expansion of the existing heap leach facilities (Figure 2-2). The source of the ore to be processed at each heap leach pad, as well as the size, land status, capacity, and height of the heap leach pads, are identified in Table 2-4.

The expanded heap leach pad (Section 17 Heap Leach Pad [Cell 12]) would be constructed on the gently sloping area in the northeastern portion of Section 17. The Section 17 Heap Leach Pad would disturb 78 acres of private land. Ore would be stacked in lifts to a maximum heap height of 300 feet, providing a 23-million ton capacity. The pad would be constructed with a conventional composite liner system consisting of either a 60-mil high density polyethylene (HDPE) geomembrane overlying a compacted 12-inch layer of low permeability (1×10^{-6} cm/sec) soil liner, or a 60-mil HDPE geomembrane overlying a synthetic clay liner. Other geomembranes may be used as approved by NDEP-BMRR. A protective layer of gravel drain rock would be placed on top of the HDPE liner to facilitate drainage and to provide cushioning to protect the liner during ore stacking. The liners would be extended beyond the pad area to allow for final reclaimed slopes of 3H:1V. All construction design and installation would be consistent with NDEP-BMRR requirements as specified in the Water Pollution Control Permit. A field quality control program would be implemented during construction that includes membrane seam testing and seam welding equipment inspection.

The Section 17 Heap Leach Pad would be connected to the existing secondary pregnant solution pond system. The solution conveyance channel would be lined with a synthetic liner (60-mil HDPE) and would provide secondary containment for process piping from the Section 17 Heap Leach Pad. This channel would account for an additional two acres of disturbance. The pregnant, barren, and storm water pond system would be expanded onto existing disturbance to accommodate the Section 17 Heap Leach Pad. The expanded pond system would have a cumulative capacity of approximately 18 million gallons, while maintaining a two-foot freeboard.

Solution from the Section 17 Heap Leach Pad would be processed in the existing ADR plant.

The proposed new heap leach facilities consist of heap leach pads, solution ponds (pregnant, barren, fresh water, and storm water ponds), an ADR facility, and lime silo. The two proposed heap leach pads would be constructed using an approved design as described for the Section 17 Heap Leach Pad. The heap leach piles would be developed with run-of-mine ore stacked in 30- to 50-foot lifts. Each lift would be placed at the natural angle of repose. The top of each lift would be cross-ripped to a depth of four feet, and solution distribution lines would be placed on the prepared surface.

The Section 30 Heap Leach would be built on the gently sloping area in Sections 19 and 30 as shown in Figure 2-7. This facility would cover 125 acres of public land and 30 acres of private land. Ore would be stacked on this pad in successive lifts to a height of 300 feet. At this heap height, the capacity of the Section 30 Heap Leach Pad would be approximately 51 million tons. This heap leach pad would be constructed in phases starting in 2003, or as soon as all project permits and approvals are acquired. Phased construction would allow operation of the heap leach pad concurrent with mining the Mackay Pit (Figure 2-3). The west side of the pad would be constructed at a 2H:1V slope, but sufficient space would be left between the constructed pad toe and the permit boundary to create a final reclaimed slope of 3H:1V. The area between the Section 30 Heap Leach Pad and the private land west of the facility would be used as an access road during the project life. The heap leach pad would be extended over the

Table 2-4: Millennium Expansion Heap Leach and Plant Processing Facilities

Processing Facility	New Surface Disturbance (acres)		Capacity Pads (tons)/ Ponds (gallons)	Maximum Heap Height (ft)	Ore Source
	Public	Private			
Existing Marigold Heap	0	0	7 million tons	300	Terry Zone Pit
Section 17 Facilities					
Pad	78	0	23 million tons		
Ponds (process and storm water)	0	0	18 million gallons	300	All pits
Columns, reagent storage, and in fill disturbance)	0	0	6,000 gallons/minute		
Conveyance channel	0	2			
Section 30 Facilities					
Pad	125	30	51 million tons		
Ponds (process and storm water)	14	2	36 million gallons	300	All pits
ADR, lime silo, fresh water pond, and infill disturbance	24	0	6,000 gallons/minute		
Section 16 Facilities					
Pad	76	0	23 million tons	300	All pits
Ponds (process and storm water)	3	0	18 million gallons		
Columns, reagent storage, and infill disturbance	1	0	6,000 gallons/minute		
Total New Surface Disturbance (acres)	321	34			

Notes: The February 2002 Minor Modification authorized increasing the height of cell numbers 3, 4, 5, 6, 9, 10, and 11 at the Marigold Heap Leach Facility from 160 feet to 300 feet, and reconfiguring the layout of Cell No. 11 (the Southwest Pad) to cover an additional 12 acres of private land. Some of the increased heap capacity derived from these changes will be used for the seven million tons of ore mined from the Terry Zone Pit.

The acres shown for the infill disturbance include the Millennium Expansion fresh water storage pond.

road prior to final reclamation grading of the Section 30 Heap Leach Pad.

The Section 16 Heap Leach Facility would be built on a gently sloping area in the southwestern portion of Section 16. The heap leach pad would cover 76 acres of public land (Figure 2-7). Ore would be stacked in successive lifts to a maximum heap height of 300 feet. At this heap height, the Section 16 Heap Leach Pad would have a capacity of 23 million tons. This facility is not scheduled for construction until near the end of mining.

Leak detection/collection systems for heap leach pads would be installed subject to NDEP and BLM concurrence. The leak detection systems would be designed to provide detection, containment and collection of leaks through the primary liner. The leak detection/collection systems would be based on NDEP-BMRR regulations and BLM Nevada Cyanide Management Plan.

2.2.4.2 Solution Ponds/ Collection System

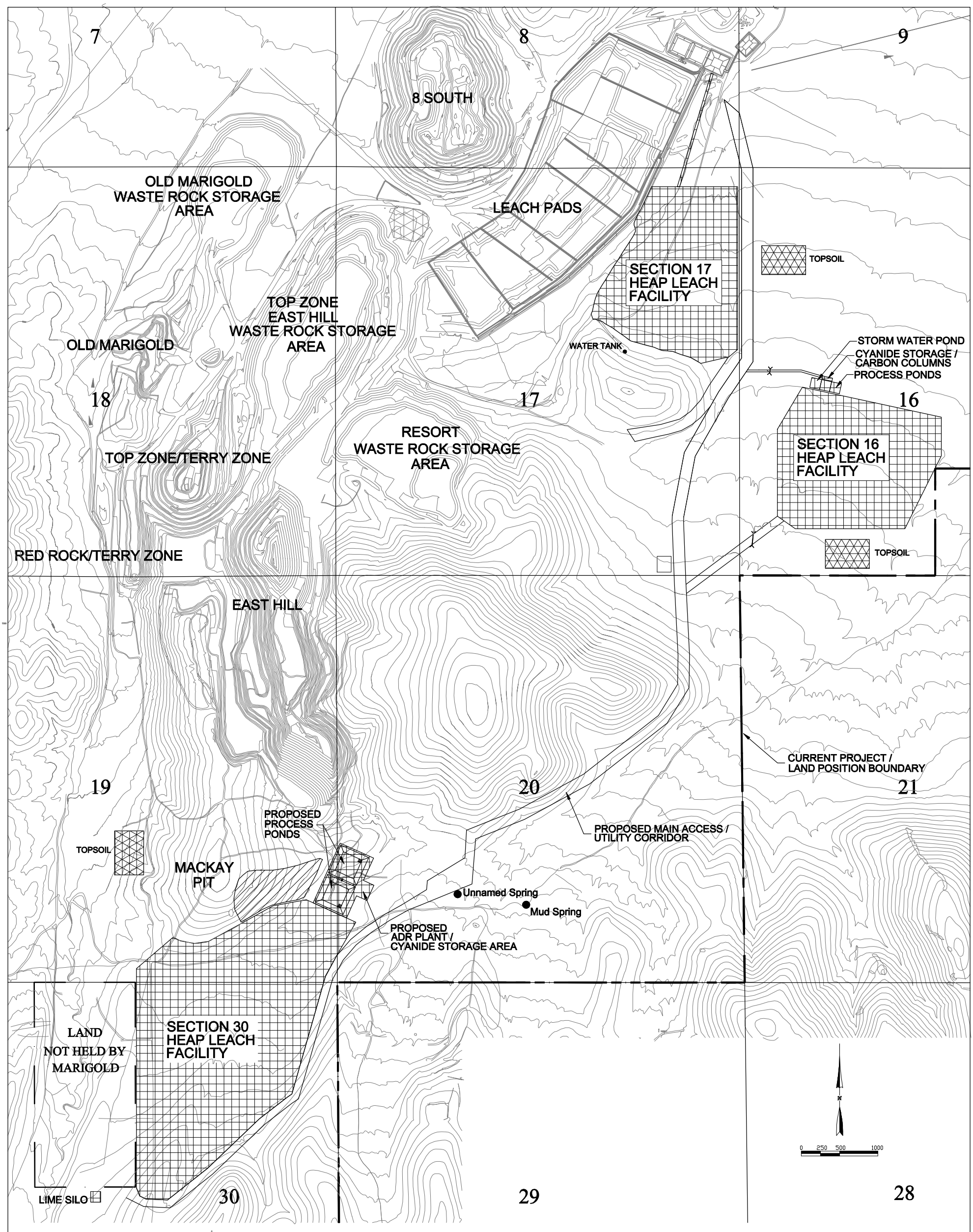
Sodium cyanide solution would be applied to the stacked ore via a spray or drip irrigation system. Leaching would be concurrent with stacking as only a portion of each pad would be under leach at any time. The total solution flow rate would be approximately 6,000 gpm. The sodium cyanide solution would percolate through the ore to the leachate collection system, and gravity feed to a collection ditch. The collection ditch would be lined with a synthetic liner placed over a compacted clay base that would have a hydraulic conductivity of 1×10^{-6} cm/sec or lower. Flow reporting to the collection ditches would be directed, via HDPE pipes, to the pregnant solution ponds (Figure 2-8).

The process ponds at both proposed heap leach facilities would be constructed with a primary 60-mil HDPE liner over a secondary 60-mil HDPE liner above a compacted clay base. The ponds would be designed to hold the working volume of solution while maintaining a two-foot freeboard following a 100-year, 24-hour storm event. As a result, the Section 30 pregnant, barren, and storm water ponds would have a cumulative capacity of 36 million gallons. The Section 16 pregnant, barren, and storm water ponds would have a cumulative capacity of approximately 18 million gallons. These ponds would be covered with one-inch mesh bird exclusion netting, attached to cables and to tie-downs off the edge of the liner. In addition, fencing that meets NDOW requirements would be installed around the solution ponds, solution channels, and solution overflow ponds to prevent access by wildlife and livestock (see Section 2.2.16). The Section 30 pregnant and barren ponds would each cover eight acres. The storm water pond would be included in the free board of the process ponds. Two acres of private land and 14 acres of public land would be associated with the process/storm water ponds. The fresh water pond is included in the infill disturbance, all on public land. The Section 16 ponds would be smaller in size with a combined area of three acres, all on public land.

Pregnant solutions would be pumped to carbon columns where gold would be adsorbed onto the carbon (see Section 2.2.4.4, ADR Facilities). The solution would then gravity feed to the barren pond for reagent concentration adjustment and subsequent reuse in the heap leach process.

2.2.4.3 Solution Pond Leak Detection/Collection System

Leak detection/collection systems would be installed between the HDPE liner and compacted clay base in the collection ditches and the pregnant and barren solution ponds. The leak detection systems would be designed to provide detection, containment, and collection of leaks through the primary liner. The leak detection/collection systems would be based on NDEP-BMRR regulations and BLM Nevada Cyanide Management Plan.



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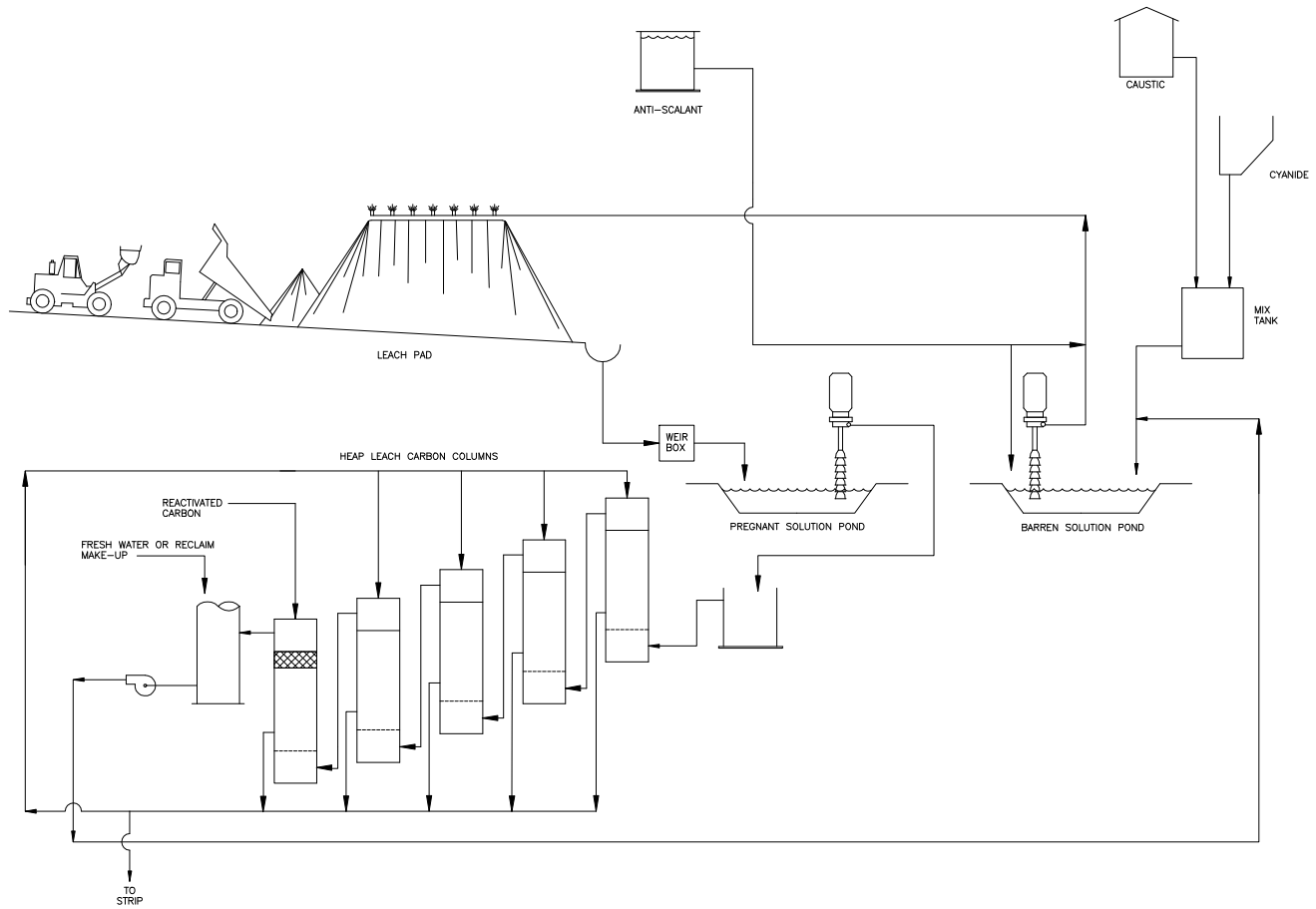
Millennium Expansion Project

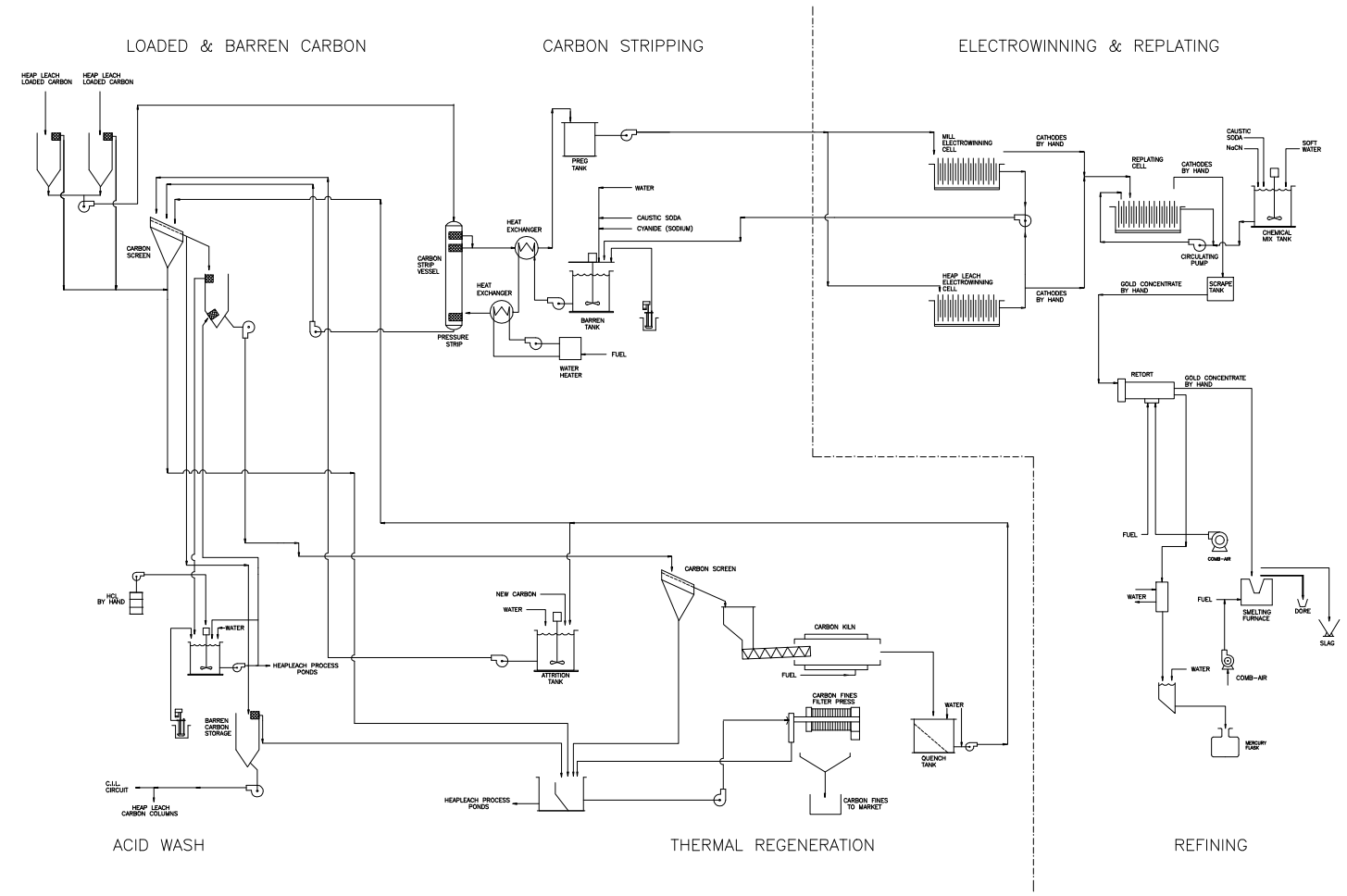
Figure 2-7

Process Areas

HEAP LEACH CIRCUIT



CARBON STRIPPING & GOLD RECOVERY CIRCUIT



Millennium Expansion Project

Figure 2-8

Process Flow Circuits

2.2.4.4 Adsorption-Desorption Recovery (ADR) Facilities

Both heap leach facilities would include processing facilities. The Section 30 Heap Leach Facility would include an ADR facility and lime silo, plus associated infill disturbance for a total of 24 acres on public land. The proposed ADR plant would be constructed on a concrete pad with curbs for containment of spills. The pad and curbs would provide capacity for 110 percent of the largest vessel, as per NDEP-BMRR regulations. The concrete pad beneath the ADR facility would drain to and be integral with the process pond system. The process ponds would provide containment for the ADR facility. The ADR facility would consist of carbon columns with a capacity of 6,000 gpm, an acid wash plant, a carbon regeneration kiln, an electrowinning circuit, a retort, a refinery, an assay lab, reagent storage facilities, an office, and enclosures. Reagents would be stored in an approved manner on the concrete pad within the ADR facility containment system. A 200-ton lime silo would be installed southwest of the Section 30 Heap Leach Pad. Lime from the silo would be added to the trucks carrying ore enroute to the leach pads.

The Section 16 Heap Leach Facility would have a truncated ADR facility consisting of carbon columns and reagent storage facilities placed within a concrete pad built with curbs that would meet or exceeded the NDEP-BMRR regulation of 110 percent capacity of the largest vessel for containment of spills. The concrete pad beneath the plant facility would drain to and be integral with the process pond system, providing containment for the ADR facility. Loaded carbon from the Section 16 Heap Leach Facility would be taken to the Section 30 ADR or the existing Marigold ADR facilities for further processing. Reagents needed for the Section 16 Heap Leach Facility would be stored in an approved manner on the concrete pad within the curbed containment area.

Gold-bearing pregnant solutions from the proposed heap leach pads would be pumped to the ADR system where the gold would be adsorbed onto the carbon (Figure 2-8).

Once the loaded carbon is transferred to the stripping section of the ADR facility, a hot alkaline solution would be used to strip the precious metals from the loaded carbon. The temperature of the alkaline solution would be approximately 285 degrees Fahrenheit (°F), with a pH of 13 or greater. The solution containing the precious metals would be passed through an electrowinning circuit where the metals would be electroplated. The resultant gold-bearing material would be processed in the mercury retort, then taken to the crucible furnace, mixed with a flux, and smelted. The stripped carbon would be cleaned by acid washing and then reactivated by heating and quenching in a rotary kiln. The crucible furnace, mercury retort, and rotary kiln would be operated in accordance with air quality operating permit No. AP1041-0158. Barren solution would gravity drain to the barren pond for reagent buffering and re-use in the heap leach circuit.

2.2.4.5 Heap Leach Closure

GMMC is proposing to stabilize all the heap leach pads by constructing an ET cover system over the spent heaps. This represents a modification of the currently approved closure and reclamation measures for the Marigold (existing and proposed expanded) and 5-North Heap Leach Facilities, and a new proposal for the Section 30 and Section 16 Heap Leach Facilities.

The construction of an ET cover system would stabilize the heap leach pads to prevent drain down solutions from having potential to degrade waters of the State, as defined in the NAC 445A.430. The details of the closure are provided in the Reclamation Section, 2.2.17.7

2.2.5 Roads

Approximately 52 acres of disturbance (27 acres of public land and 25 acres of private land) would be associated with access and haul roads. Figure 2-2 shows the location of the proposed access and haul roads needed for the Proposed Action. Dust control measures for all road surfaces would include direct water application and the use of chemical binders or wetting agents.

Existing public access would remain to areas outside of the Glamis Marigold Mine and of the proposed Millennium Expansion Project operations boundary. No relocation of public access roads is necessary under the Proposed Action.

2.2.5.1 Access Roads

A mine access road and utility corridor would be constructed from the existing office complex area to the Millennium Expansion Project Area. Access roads would generally be two-way thoroughfares with adequate size to safely accommodate mine traffic utilizing optimum widths based on the largest anticipated vehicle size. The access roads would consist of recompacted native materials exposed during clearing and grubbing operations. In-situ native materials, which are not suitable for the intended sustained design traffic, would be augmented with suitable on-site native materials to enhance road-bed performance. When practical during clearing and grubbing operations, growth media would be stockpiled for future reclamation purposes.

Access roads would be graded to promote positive drainage off of the rolling surfaces to adjacent side ditches for storm water removal. Steeper grades would include appropriate Best Management Practices (BMPs) to limit erosion and sediment transport. The BMPs may include, but would not be limited to, breaks in the berms to direct storm water to sediment ponds or creation of sediment barriers.

2.2.5.2 Haul Roads

Haul roads would be constructed from the Terry Zone Pit and the Antler and Basalt pits to the Section 30 Heap Leach Facility and the new shop area. Haul roads from the proposed new pits to the Section 30 Heap Leach Facility, new truck shop, and waste rock storage areas would be constructed in concert with the construction of the waste rock storage areas and would not require additional disturbance (i.e., the disturbance is included in the waste rock storage area disturbance).

Haul roads would be constructed in conformance with Mine Safety and Health Administration (MSHA) regulations. Traffic control signs (i.e., stop, yield speed limit, etc.) would be posted for all haul roads. In general, haul roads would be sized to safely accommodate two-way haul truck traffic, utilizing optimum widths based on the largest anticipated vehicle at the site. Haul roads would be crowned to allow drainage of water off the travel surface. Roads would be graveled, with limited cut-and-fill in steep terrain. Culverts would be installed under the haul roads at required locations. The roads would be continually maintained to ensure safety and efficiency and to minimize dust emissions. Surface compaction and binding agents would be used on roadways.

2.2.6 New Support Facilities

New support facilities consisting of a truck shop, large equipment wash bay and adjacent sump, offices, fuel and oil storage and dispensing areas, warehouse, septic system, propane tank, equipment parking area, communications system, and fresh water and fire water storage and supply distribution facilities, would be constructed in Section 31. The new support facilities would cover seven acres of public land. The buildings would be constructed on a concrete base. The fuel and oil storage and dispensing facilities would be constructed on a liner within a bermed area with sufficient capacity to contain 110 percent of the capacity of the largest tank. All of the fuel storage vessels would be above ground tanks.

2.2.7 Growth Media Stockpile Areas

Prior to construction of the proposed new and expanded facilities, growth media would be removed and stockpiled in existing or new stockpiles for subsequent use in reclamation. To accommodate the anticipated volume of growth media that would be salvaged, two new growth media stockpiles would be developed in Sections 19 and 16 (Figure 2-2). The stockpiles would cover approximately five acres. The soil stockpiles are sufficiently sized to handle the topsoil that would be stockpiled. In addition, the berm created around each of the waste rock facilities and heap leach pads would be created with growth media salvaged prior to construction of these facilities and would be available for reclamation.

Interim stabilization measures would be implemented to protect the new and existing stockpiles from wind and water erosion, and from invasion by invasive and noxious weeds. The interim measures would consist of seeding with perennial grass species, and shaping the facilities to slopes of less than 2.5H:1V to reduce erosion. On-site trials using different seed species may be conducted on portions of the stockpiles to determine the most effective species for stabilization.

2.2.8 Storm Water Control

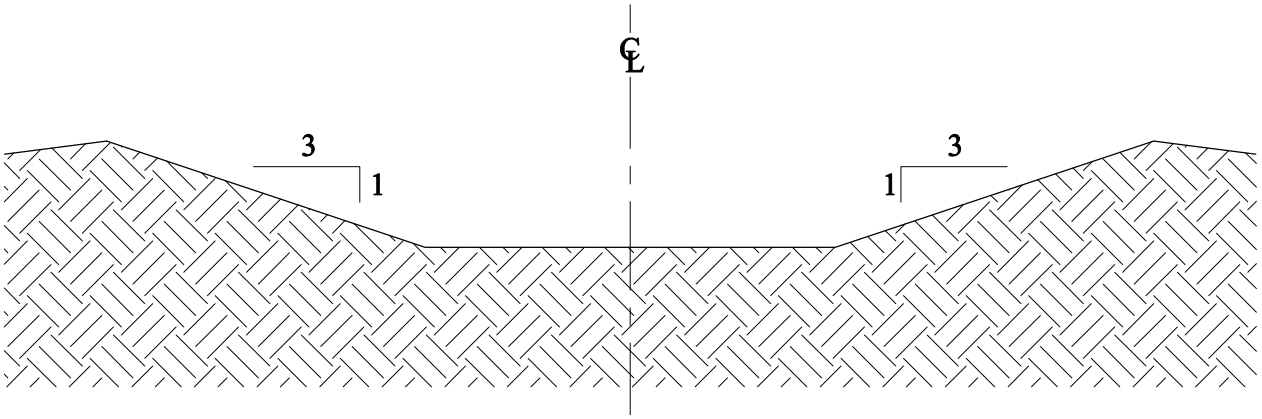
The Proposed Action would require new storm water control structures to protect project structures from inundation by storm flows, prevent surface runoff from entering pit areas, and to prevent degradation of waters of the state from increased sedimentation. Storm water surface flows would be routed away from the Project Area by installation of new diversion (temporary and permanent) ditches and culverts, and sedimentation would be reduced by installation of sediment traps or sediment settling ponds. These features would be constructed based on operational needs and in accordance with GMMC's General Storm Water Discharge Permit (Permit NVR 300000) and would conform to established BMPs. Figure 2-5 shows the location of the planned storm water diversions. The surface disturbance associated with constructing these structures is accounted for in the disturbance acreage shown for each facility.

The permanent diversion ditches would be designed and built to handle the 100-year, 24-hour storm event. As shown in Figure 2-9, the diversion structures would typically have a trapezoidal shape and minimal slope to maintain a flow velocity of less than four feet per second (fps). Armored rip rap would be placed along portions of the diversion channel where the average flow velocity could exceed this rate. Preliminary flow estimates indicate diversion dimensions consisting of a six-foot base and a four-foot depth would be adequate in most cases. The side slopes would be constructed with 3H:1V slopes. The surface disturbance width created by constructing the diversion ditches is estimated conservatively to be 45 feet to provide ample room for disturbance created during equipment access. These diversion dimensions would be modified as necessary to fit site topography and hydraulic conditions in order to accommodate the flow from the 100-year, 24-hour design storm event. The surface disturbance associated with the storm water control measures is included in the disturbance acreage for each facility, rather than as a separate disturbance category.

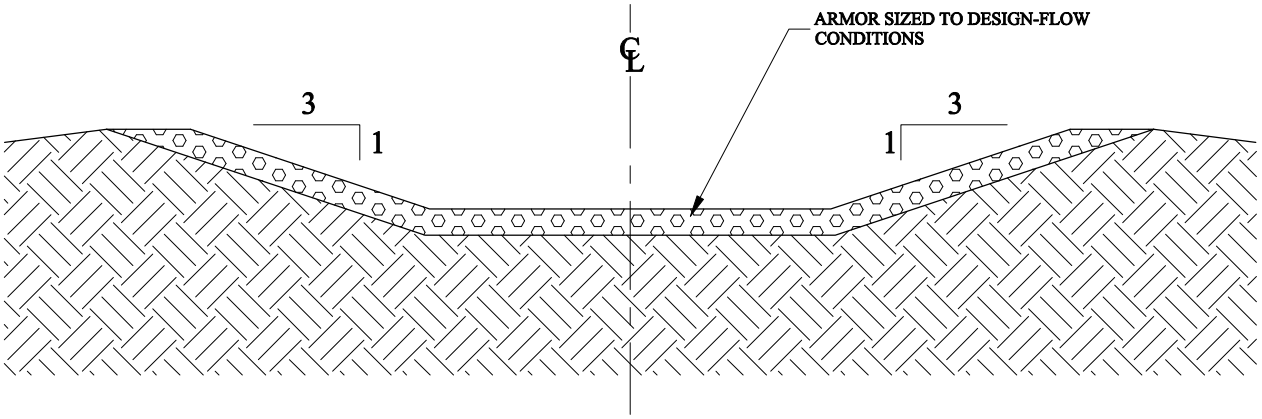
Temporary or permanent sediment control measures would be installed at the end of the diversion structures. Sediment control measures would consist of sediment settling ponds and/or sediment traps constructed of rip rap, hay bales, or geotextile fences.

It is anticipated that culverts would be needed at locations where access and haul roads cross drainages. The culverts would be sized using appropriate Hydrologic Engineering Center 1 methodology and as dictated by site-specific construction conditions. As presently planned, culverts would range in size from 24 to 42 inches in diameter. Multiple culverts may be required at some drainage crossings to provide a measure of redundancy to ensure proper flood flow control.

Storm water would be monitored in accordance with state requirements for storm water pollution prevention that would be effected as a result of permitting activities under the Nevada Storm Water General Discharge Permit NVR 300000. These permitting activities would be an ongoing part of the project, and permit approval would be obtained prior



TYPICAL EARTHEN CHANNEL
VELOCITY < 4 FT/S
(Dimensions to accommodate the
design flow plus freeboard)



TYPICAL REINFORCED CHANNEL
VELOCITY > 4 FT/S
(Dimensions to accommodate the
design flow plus freeboard)

Not to scale

Millennium Expansion Project

Figure 2-9

Storm Water Diversion Structures

to beginning operations. A storm water monitoring plan would be developed as a part of related permit applications and submittals to the state. General monitoring schedules that may be specified include quarterly or monthly monitoring in addition to monitoring after major storm or snowmelt events. Additional monitoring and control technologies may be further specified as part of Water Pollution Control permitting activities with the state.

Runoff from the waste rock storage areas, due to extreme meteoric events, would generally be directed via berms constructed around the storage areas to diversion ditches and eventually to the storm water sediment basins.

Storm water that contacts solutions containing cyanide would be managed as process solutions. Design criteria for storm water management are addressed in the facility design. Storm water that collects in the storm water storage pond located adjacent to the existing solution ponds would be utilized for make-up process water.

Access roads would be graded to promote positive drainage to adjacent side ditches for storm water removal. BMPs would be used to limit erosion and sediment transport on steeper grades. None of the proposed access roads would cross any perennial or intermittent streams. Culverts would be installed for crossing significant drainage swales, and low water crossings would be utilized on minor topographic rills and gullies. Sediment basins would be constructed as necessary to control sediments from storm water runoff.

2.2.9 Water Supply

The existing, authorized water supply system, including three existing water wells and water provided from dewatering operations at the nearby Newmont Mining Corporation's Lone Tree Mine, would be used for the Proposed Action. GMMC has the necessary water rights for these water supply wells from the State Engineer, Nevada Division of Water Resources.

Expanded fresh water storage capacity would be required to meet the expansion needs of the Proposed Action. The existing fresh water storage tank would be connected by pipeline to a fresh water storage pond and then to storage tanks placed on existing disturbance in a pit, infill area or waste rock storage area. The fresh water storage pond would be constructed at the Section 30 Heap Leach Facility. A pumping booster station would be constructed in an area of existing disturbance at the existing water tank. Water would be distributed from the water tank via a buried pipeline that would be located in the utility corridor. A total of 21 acres (11 acres of public land and ten acres of private land) would be disturbed to accommodate the new water supply system. The disturbance acreage associated with the fresh water storage pond is included in the infill disturbance area.

The use of recycled water from the heap leach facilities would continue in order to minimize the amount of fresh water needed for the operation. The interconnect to the supply system serving Lone Tree's Trenton Canyon facility can supply approximately 90 to 95 percent of the processing water requirements, up to an additional 1,000 gpm; however, the amount may be less than 60 percent of the processing requirement, depending on availability. The well system is capable of providing approximately 600 gpm. The existing fresh water supply systems and the continued use of recycled water would supply sufficient water for the existing and proposed operations.

2.2.10 Electric Power

Power needs for the proposed new facilities in Sections 16, 19, 20, and 30 would be supplied by extending the existing power line from the Glamis Marigold Mine facilities to the expansion areas. The new system would consist of a surface power line, up to two stationary substations, and one mobile substation. A portion of the power system would be confined to the proposed utility corridor associated with the access road that would extend from the existing facilities in Section 8 to the new ADR plant in Section 20 with a branch extending to the Section 16 ADR plant. The power line would then leave the utility corridor and extend along the eastern project

boundary from the ADR plant area to the Section 31 shop/warehouse/office complex and mining areas show on Figure 2-2. Appropriate substations would be connected to this power line to maintain power at the currently approved processing area, shop/office/warehouse complex and mine facilities, while extending power to the proposed facilities. The disturbance acreage associated with the power system expansion is included in the utility corridor and access roads described in Section 2.2.4.

2.2.11 "Infill" Areas

The Proposed Action includes 114 acres of surface disturbance (51 acres of public land and 63 acres of private land) as "infill" surface disturbance. The infill areas are small areas adjacent to and in between project facilities as shown in Figure 2-2. Although not identified for any specific purpose, these areas may be used for access or may be disturbed during construction of project components. These areas may also be used for temporary laydown yards for storage of extra pipe, culverts, and other non-hazardous materials. Inclusion of these infill areas in the project surface disturbance calculations is a conservative measure to ensure that all land near active project components that could be affected by project operations is reflected in the surface disturbance totals.

2.2.12 Security and Fencing

Security in the Project Area would be the responsibility of GMMC. The security system would include direct security measures, supported by employees involved in the day-to-day operation. Persons entering and leaving the area would be required to gain clearance through a gate located near the entrance to the mine site. A four-strand barbed wire fence exists around the current disturbance footprint. Additional chain link fencing and electronic gates prevent unauthorized access to the mill area, administration building, and shop facilities. The current permit boundary would be partially enclosed with a BLM-approved range control fence, consisting of three strands of barbed wire and a fourth bottom strand of smooth wire (Figure 2-5). Fencing that meets both BLM and NDOW requirements would be installed around facilities such as ADR plant, solution ponds, open solution channels, and storm water ponds to prevent access by wildlife and livestock; this fencing currently surrounds existing process ponds and channels. Any monitoring wells located outside the fenced area would be clearly marked and locked. Additional fences or controls would be installed as necessary.

2.2.13 Fire Protection

GMMC has a Fire Protection and Suppression Plan within the Emergency Response Plan, to comply with MSHA requirements. The Fire Protection and Suppression Plan outlines appropriate fire fighting, evacuation, and notification procedures to be used in the event of a fire. Fire extinguishers are located throughout all work areas and on all mobile equipment. Mobile equipment also has spark arrestors. Dry chemical or carbon dioxide (CO_2) extinguishers are located in areas in which an electrical fire may occur.

GMMC employees are provided with appropriate instruction in the use and location of the fire extinguishers, the site evacuation plan, and the emergency notification protocol in the event of a fire. If a fire extinguisher is used, the used fire extinguisher must be turned in to the supervisor for replacement. In compliance with MSHA fire extinguisher inspection and maintenance requirements, the fire extinguishers are inspected monthly and serviced annually. Smoking, building fires, or using open-flame appliances in posted areas or locations where gasoline, chemicals, or similar flammable substances are stored or handled is prohibited.

Supervisors are responsible for notifying fire-fighting agencies in the event there is a fire that cannot be extinguished using on-site personnel and equipment. Supervisors would take appropriate measures to shut off propane and electrical supply lines in areas affected by the fire. GMMC personnel would guide fire-fighting personnel to the fire scene and would cooperate fully with fire department officials. After the fire has been extinguished, the supervisor would remain at the scene and complete a thorough report of the event and the damage caused by the fire.

BLM and GMMC have a Mutual Aid Agreement for fire suppression. Range fires detected within the project vicinity would be reported to GMMC's Safety Supervisor. The Safety Supervisor would report the range fire to the BLM and adjacent landowners. Support equipment available to fight range fires includes one water truck with hose, a fire trailer equipped with two 100-pound extinguishers, hoses, nozzles, and fittings. In addition, fire suppression systems are installed on haul trucks, loaders, drills, and dozers to extinguish equipment fires.

2.2.14 Exploration Drilling Pads, Access Roads, and Sumps

Exploration drilling activities would continue under the Proposed Action. The objectives of the drilling program would be to identify new ore reserves and to provide support data for short- and long-term mine planning. Drilling would be conducted within the proposed permit boundary. Exploration activities conducted outside of the proposed permit boundary would be performed under an exploration notice.

Drill pads and sumps, when used, would typically be 40 feet wide by 40 feet long. Access roads to the drill pad sites would be approximately 20 feet wide with an operating width of 12 feet. Existing roads would be used, where possible, to minimize new disturbance. New roads would only be constructed when existing roads or overland travel would not provide safe, efficient access. Track drills are used whenever possible to reduce the need to construct drilling facilities.

In steep terrain, growth media from drill pads and roads would be stripped and stockpiled for use during reclamation activities. Each drill pad would be constructed with two mud pits; one would be used for settling of the drill cuttings, and the second would be used for settling of the mud solids. A berm would be constructed on the downhill side of each drill pad to provide containment and prevent runoff from the drill pad area. Track drills would be used to limit surface disturbance. Exploration activities would take place primarily in previously mined pits to take advantage of the lower elevation from which to drill, or would occur on areas proposed for waste rock disposal.

2.2.15 Hazardous Materials and Wastes

2.2.15.1 Reagent Transport and Storage

No changes to the types of chemicals utilized would occur under the Proposed Action. However, the quantities used and stored on site would change for some chemicals. All process chemicals and petroleum products would continue to be handled and disposed of in accordance with applicable Nevada and MSHA laws and regulations. The list of reagents and fuels used and stored at the mine site are provided in Table 2-5. The hazardous materials utilized at the mine are handled pursuant to manufacturers' Material Safety Data Sheets (MSDS) and applicable regulations. Transportation and handling of chemicals are conducted by licensed carriers and properly trained workers. All vehicles and containers display the appropriate placards. All chemicals would continue to be transported to the mine by licensed commercial carriers on public roadways in accordance with applicable regulations. Routes used to transport chemicals include I-80 and the Buffalo Valley Road.

Chemicals would be stored in an approved manner on the concrete pads, within the plant containment systems. Petroleum fuels would be stored at the new support facilities area in Section 31 (see Section 2.2.6) in aboveground tanks and surrounded with a containment structure to accommodate at least 110 percent of the volume of the largest tank within the containment area. The tanks would be located in compacted clay basins with a clay berm covered by waste rock.

Chemicals used in the ADR plant are stored nearby in concrete-lined basins with concrete side walls and capacity for 110 percent of the largest vessel.

Table 2-5: Millennium Expansion Reagent and Fuel Storage Information

Reagent of Fuel	Existing Amounts On-Site	Proposed Amount to be Stored On-Site	Total Amount to be Stored On-Site
Sodium Cyanide	40,000	80,000	120,000 gallons
Muriatic (Hydrochloric) Acid	3,000	No increase	3,000 pounds
Sodium Hydroxide	30,000	40,000	70,000 gallons
Antiscalant	2,000	3,000	5,000 gallons
Lime	75,000	400,000	475,000 pounds
Activated Carbon	20,000	No Change	20,000 pounds
ANFO	100,000	200,000	300,000 pounds
Diesel	40,000	60,000	100,000 gallons
Gasoline	10,000	10,000	20,000 gallons

GMMC has been issued a Hazardous Materials Permit by the State Fire Marshal Division, Hazardous Materials Section. The issuance of this permit is contingent on GMMC meeting the state standards for hazardous material storage and containment. If required, additional spill containment facilities would be installed to reduce the probability of a significant release.

2.2.15.2 Spill Prevention and Emergency Response

A Hazardous Material Spill and Emergency Response Plan has been prepared for the existing mine facilities in accordance with the State of Nevada regulations governing the design, construction, operation, and closure of mining operations (NAC 445A.242 through 445A.243).

The type of chemicals and petroleum products utilized by and consumed at the Glamis Marigold Mine are not expected to change as a result of the Proposed Action (Table 2-5). Of the chemicals stored and utilized on-site, sodium cyanide, muriatic acid (hydrochloric acid), and sodium hydroxide are hazardous substances that are listed in 40 CFR 302.4 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (including The Emergency Planning and Community Right-to-Know Act); and the hazardous substances appendices of the Superfund Amendments and Reauthorization Act (SARA). CERCLA provides a framework for Federal response to the release of hazardous substances. For purposes of emergency response planning under SARA, Title III, a threshold planning quantity and reportable quantity are established for each hazardous substance. In conformance with these regulations, GMMC has developed and implemented an Emergency Response Plan (ERP) for the Glamis Marigold Mine. The ERP would be amended to include the Millennium Expansion Project. These plans provide for the tracking and required reporting of hazardous substances used on-site as well as provide a system for prevention, discovery, notification, and safe cleanup of all spills or discharges that may impact the environment.

Materials that are classified as hazardous for transportation purposes are regulated by the U.S. Department of Transportation (USDOT) per 49 CFR 172.101. The USDOT hazardous materials list includes hazardous substances regulated under CERCLA, as well as other types of chemicals. In addition to the hazardous substances described above, transportation of ammonium nitrate, Class A explosives, diesel fuel, cement, and calcium oxide (lime) must comply with USDOT hazardous materials packaging and labeling requirements. All chemicals would continue to be stored and handled in accordance with the manufacturer's recommendations and state regulations. The MSDSs for all chemicals used at the mine site would continue to be kept at locations accessible to employees.

2.2.15.3 Explosives Storage

Explosives would be stored in approved explosive storage facilities adjacent to the pits. Storage of these materials would comply with the Bureau of Alcohol, Tobacco, and Firearms (BATF) permit and regulations.

2.2.15.4 Waste Management

Non-hazardous solid waste generated at the Glamis Marigold Mine would continue to be disposed of in the approved waivered-Class III landfill located on private lands in accordance with state and federal regulations. No hazardous wastes, liquid wastes, or petroleum products would be disposed of at the site. The landfill would continue to be inspected weekly to ensure that only non-hazardous solid waste is deposited in the landfill.

GMMC currently recycles all used oil, solvents, antifreeze, and batteries through licensed contractors. Hydrocarbon contaminated soils are currently managed within the NDEP-BMRR permitted bio-remediation facility. All domestic wastes would continue to be disposed of in the existing or new septic systems.

2.2.16 Environmental Protection Measures and Monitoring

Environmental protection measures and monitoring for the Proposed Action would include sediment control, waste rock monitoring, spill prevention, groundwater sampling and monitoring, stability monitoring of facilities, wildlife and livestock protection structures, dust control, cultural and paleontological resource protection, and an employee environmental education program.

2.2.16.1 Sediment Control

Sediment control would be provided by a combination of BMPs at each facility. The heap leach and chemical/petroleum storage areas would be contained within an exclusionary berm. The waste rock storage areas would have storm water containment berms and sediment basins to reduce runoff impacts to receiving waters. The waste rock storage areas would be reclaimed concurrently to reduce sediment loss. This would include ripping compacted surfaces and an application of growth media to increase permeability to the vegetation root zone. Temporary storm water diversions would be installed where appropriate and armored where flow velocities exceed approximately four fps, dependent on channel material. Permanent diversion structures would be designed to withstand flow from the 100-year, 24-hour event.

2.2.16.2 Waste Rock Characterization

Waste rock samples would be submitted as determined by the Water Pollution Control Permit requirements for analysis as required by the NDEP-BMRR. Waste rock analyses may include MWMP and ABA analysis, as outlined in the site's Water Pollution Control Permit. Analyses would be reported to the NDEP-BMRR and BLM. If the ABA tests exceed the NDEP-BMRR and BLM criteria and MWMP and/or pH analysis is below the state standards, then kinetic testing (humidity cell tests) may be performed.

To date, waste rock analyses have indicated low potential for acid generation due to the low sulfide content of the waste rock. If waste rock monitoring were to indicate the material had the potential to generate acid, that portion of the waste rock would be subject to a BLM-approved materials management plan (i.e., Sulfide Waste Management Plan). The plan provides for early identification of and blending and/or encapsulation of potential sulfide waste rock in oxide material at one of the out-of-pit waste rock storage areas. A minimum blending ratio of 3:1 acid-neutralizing to acid-generating material would be used. A minimum depth of 20 feet of oxide material would be used to encapsulate unblended potential sulfide material, and a minimum depth of 15 feet would be used to encapsulate blended material. These measures would reduce the potential for generation of acid rock drainage, thereby reducing the potential impact on surface and groundwater.

2.2.16.3 Spill Prevention Monitoring

Storm Water Discharge

The various storm water diversion and sediment control structures would be monitored by visual inspection to ensure the integrity of the berms. If necessary, precipitation accumulated within process component containment areas after major storm events would be removed by pumping, and disposed of in the heap leach processing facilities. Storm water diversion structures at the waste rock storage areas would be visually inspected after major storm events and during spring snowmelt to verify the integrity of the diversion structures and to remove accumulated debris that could impede water flow. These monitoring efforts comply with the requirements in the General Storm Water Permit (NVR 300000). Monitoring data would be reported to the NDEP Bureau of Water Pollution Control (BWPC) on an annual basis. Additional monitoring and control technologies would be further specified as part of state permitting activities (i.e., General Storm Water Permit), which includes applications and reviews for Storm Water General Discharge and Water Pollution Control permits as identified in Table 1-2.

Groundwater Monitoring

Groundwater monitoring would be conducted on a quarterly basis. Water quality samples would be collected from the existing monitoring wells and from new groundwater monitoring wells that may be developed in association with the new heap leach facilities. The samples would be analyzed for the constituents specified in the site's Water Pollution Control Permit. Monitoring data would be submitted to the NDEP-BMRR and BLM on a quarterly basis.

Production Wells

Samples would continue to be collected from the fresh water production wells on an annual basis. The samples would be analyzed for the constituents specified in the site's Water Pollution Control Permit. Monitoring data would be submitted to the NDEP-BMRR and BLM on an annual basis.

Process Solutions

Monitoring of the heap leach facilities would include daily inspection to verify the liner containment system is functioning properly. Flow rates for the heap leach pad leak detection, and pregnant pond and barren pond leak detection sumps, would be monitored weekly. If fluid is present at the monitoring ports, then the sumps must be evacuated and monitoring must be conducted on a more frequent basis. The daily, weekly, and quarterly monitoring and sampling must be documented in the quarterly monitoring report submitted to NDEP-BMRR and BLM. Samples from the pregnant ponds, barren ponds, tailings solution, and tailings reclaim water must be collected and analyzed annually for the constituents specified in the Water Pollution Control Permit.

2.2.16.4 Stability of Facilities

Waste rock storage areas, dam structures, and heap leach facilities would be designed and constructed to ensure stability during construction, operation, and post-closure. Stability modeling results for the heap leach pads and dam structures would be included in applications for the NDEP, Division of Water Resources (NDWR) – Dam Safety Branch and NDEP-BMRR permits. These facilities would be monitored on a regular basis during operations to identify any visible stability problems.

2.2.16.5 Wildlife and Livestock Protection

To prevent access by wildlife and livestock, fencing that meets NDOW requirements would be installed around solution ponds, storm water ponds, and open conveyance solution channels. The proposed permit boundary would be partially enclosed with a BLM-approved range control fence. Any monitoring wells located outside the fenced area would be clearly marked and locked. Additional fences and controls would be installed as necessary.

Additional protection measures that have been incorporated into the operation for the protection of wildlife and livestock include: 1) installation of netting over open conveyance solution channels and ponds

to prevent access by birds and bats, 2) proper management of the waivered-Class III landfill, 3) formalized procedures for verbal and written reporting of wildlife mortalities to the NDOW, and 4) monitoring and managing cyanide concentrations of the process solutions.

GMMC has committed to contracting with a qualified biologist to conduct breeding bird surveys within all suitable habitats prior to ground disturbance, if construction activities were to occur from March through July. This survey would identify either breeding adult birds (i.e., by territorial defense behavior) or nest sites within the areas to be disturbed. If active nests are present, GMMC would then coordinate with the BLM to develop appropriate protection measures for these sites, which may include avoidance, construction constraints, buffer establishment, etc. An option to conducting breeding bird surveys would be to avoid ground disturbance activities between March and July, allowing construction to proceed outside of the breeding season without clearance surveys.

2.2.16.6 Air Quality

GMMC has incorporated a number of measures into the existing operation to control the generation of PM_{10}. These measures would also be incorporated into the operation of the Proposed Action. To control fugitive dust, water or chemical stabilizers would be applied to haul and access roads within the Project Area. Speed restrictions would be enforced to further minimize particulate emissions from roadways. Concurrent reclamation during the life of the operation, as project components are completed, would reduce the acreage of disturbed lands, thereby reducing fugitive dust. Enclosures, baghouses, binder chemicals, and water sprays would be used as appropriate to control dust emissions from existing crushers, screens, crusher transfer points, and dry chemical transfer points (lime).

2.2.16.7 Cultural and Paleontological Resources

Protection measures have been incorporated into the existing operation to prevent and minimize potential impacts to cultural and paleontological resources within the Project Area. These measures, identified below, also would provide protection of resources during development and operation of the Proposed Action. GMMC has developed the Proposed Action with regard to the location of sites known to be eligible for inclusion on the National Register of Historic Places (NRHP). Avoidance of these sites has been incorporated into the PoO. However, to avoid inadvertent impacts to these sites, GMMC has proposed a Cultural Resource Protection Program for the Millennium Expansion Project.

- Employee and equipment access would be prohibited in known eligible cultural sites to prevent the potential for direct impacts to resources. Mine exploration and operations equipment would be limited outside of the proposed permit boundary, which would be clearly marked. Employee access to known archaeological and paleontological sites on private land in the vicinity of the mine would be prohibited;

- Establish a 30-meter “buffer zone” around the eligible site boundary by installing a two-strand smooth wire fence with signage “No Off Road Travel.” The buffer zone would be established by a qualified, third party archaeologist approved by the BLM.

- Employee education programs for employees;

- Known site locations would be avoided by exploration activities;

- Secondary effects to eligible sites resulting from road and drill pad construction and use would be minimized through the implementation of erosion control measures

such as water bars, double sumps for drill water, and appropriate road design;

- If a previously undocumented archaeological site or subsurface components of documented sites are discovered during exploration, construction, operation, or reclamation activities, GMMC would cease activities in the area of the discovery until resources could be examined by a BLM-approved archeologist. If resources are identified as eligible for the National Register of Historic Places (NRHP), impacts would be mitigated through an appropriate treatment plan approved by the BLM, the State Historic Preservation Officer (SHPO), GMMC, and the Advisory Council, or through site avoidance; and

- If significant fossiliferous deposits, specifically vertebrate fossil deposits, are located during exploration, construction, operation, or reclamation activities, the BLM would be notified, and measures would be taken to identify and preserve or avoid the fossils.

2.2.16.8 Employee Environmental Education Program

GMMC currently provides environmental education for its employees. This training includes information on management practices incorporated into the operation of the facility to minimize impacts to the environment and ensure compliance with environmental permit criteria. This program would be continued throughout the operation of the Proposed Action. GMMC also is developing an operator's Environmental, Health, and Safety Compliance Handbook, in addition to maintaining detailed compliance schedules.

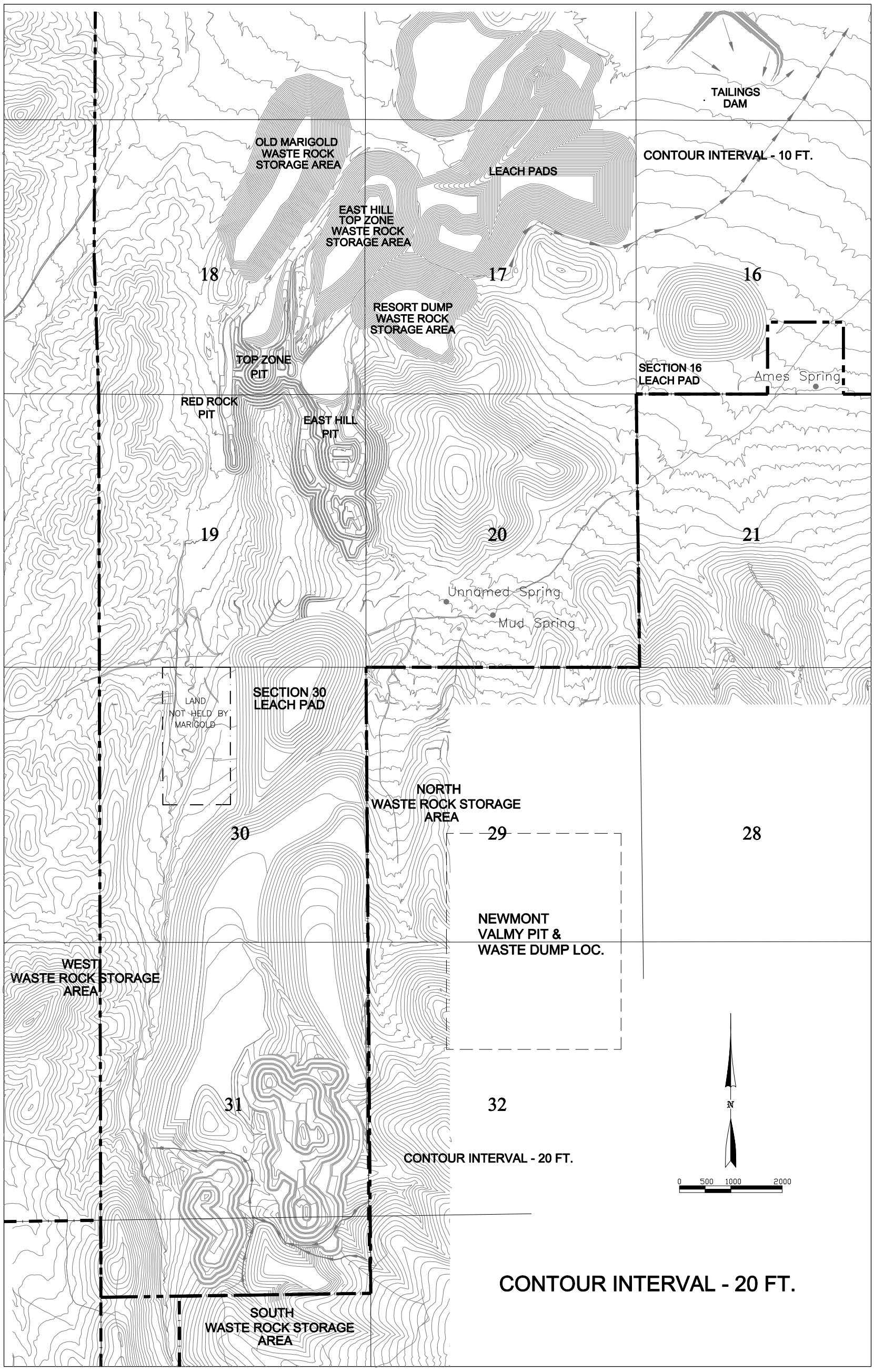
2.2.17 Reclamation

GMMC proposes to increase the authorized surface disturbance at the Glamis Marigold Mine from approximately 1,831 acres to approximately 3,305 acres. Most of the disturbance associated with the Proposed Action would result from the development of the five new pits, associated waste rock storage areas, development of the Section 30 and Section 16 Heap Leach Facilities, ancillary facilities, and infill areas. Reclamation would be both concurrent and post-use, following the plans currently approved for and utilized by GMMC at the existing operation. Post-mining topography for the Proposed Action is presented in Figure 2-10.

A summary of reclamation acreages by project facility is presented in Table 2-6. Approximately 2,964 acres of the 3,305 acres disturbed as a result of the implementation of the Proposed Action and existing disturbance would be reclaimed after mine operations.

A detailed Reclamation Plan has been submitted as part of the BLM Plan of Operations and NDEP-BMRR Reclamation Permit. The Reclamation Plan includes bond calculations that estimate the cost of closure and reclamation for all facilities, including decommissioning facilities, heap leach closure, interim fluid management, all recontouring and regrading work, seeding, and post-reclamation monitoring. The bond approval is part of the permitting process and the bond must be secured prior to any project-related disturbance.

The reclamation approach and procedures were developed based on the site-specific conditions at the mine site. These procedures were designed so that the mining-related disturbance would be reclaimed to a productive use similar to the pre-mining land uses, and the reclaimed areas would be visually and functionally compatible with the surrounding topography. The goal of the reclamation plan is to promote public safety, minimize visual impacts, and to re-establish stable topographic features that support a diverse, self-sustaining vegetative community. Pre-mining land uses included wildlife habitat, domestic



Millennium Expansion Project

Figure 2-10

Post Reclamation Topography

livestock grazing, dispersed recreation, and mineral exploration.

The reclamation procedures currently used at the Glamis Marigold Mine incorporate five basic components:

- Establishment of stable topographic surface and drainage conditions that would be compatible with the surrounding landscape and serve to control erosion;
- Establishment of soil conditions most conducive to establishment of a stable plant community through stripping, stockpiling, and reapplication of suitable growth media;
- Revegetation of disturbed areas to establish a long-term productive biotic community compatible with proposed post-mining land uses;
- Consideration of public safety through stabilization, removal, and/or fencing of structures or landforms that could constitute a public hazard; and
- Consideration of the long-term visual character of reclaimed areas.

Revegetation success would be determined based on criteria outlined in Nevada Guidelines for Successful Revegetation (NDEP-BMRR and BLM 2000).

2.2.17.1 Growth Media Stockpiling and Use

Prior to development of the facilities under the Proposed Action, suitable growth media would be salvaged and stored in the existing (three) or new (two) growth media stockpiles (Figure 2-2) and as berms around the various facilities, such as the berm between the West Waste Rock Storage Area and Trout Creek. Suitable alluvial material also would be used to supplement the growth media. The stockpiles would be seeded with an interim seed mix to minimize wind and water erosion or establishment of invasive and noxious weeds.

2.2.17.2 Grading and Stabilization

Concurrent reclamation would be conducted at the earliest economically and technically feasible time (e.g., waste rock storage areas). For other facilities (e.g., heap leach pads, ADR plant, etc.), grading and stabilization would be conducted when the individual components are no longer required for mine operations or when facilities are decommissioned and site closure begins.

Slopes would be contoured in preparation for reclamation. Final grading of cuts and fills in unconsolidated material would be conducted to create stable, undulating landforms to prevent pooling or ponding, and to blend with the surrounding undisturbed topography. Final grading would minimize erosion potential and additional surface disturbance, and would facilitate the establishment of post-mining vegetation.

After cessation of mining, the pits would be bermed and fenced as determined by the Nevada Division of Minerals ranking system. Highwalls would be left in a stable configuration, and subject to natural processes. Slope angles in the open pits would range from approximately 34 to 55 degrees, depending on the pit and the specific location within the pit. Final pit wall configurations would be determined by pit economics, rock type and strength, geologic structure, and the results of previous studies and construction. The pit walls would gradually ravel and slough over time to the natural angle of repose for the individual rock types.

2.2.17.3 Surface and Seedbed Preparation

Prior to growth media application, disturbed areas would be inspected for slope stability, topographic diversity, surface water drainage capabilities, and compaction. Compacted surfaces would be loosened and left in a rough condition by ripping, followed by disking or other mechanical manipulation. Tillage implements may be used as needed for all areas to be reclaimed that could safely be worked by surface

Table 2-6: Acreages Disturbed and Reclaimed After the Proposed Action

Facility	Disturbed Acres[1]			Reclaimed Acres		
	Public Land	Private Land	Total	Public Land	Private Land	Total
Pits	488	461	949	433	246	679
Waste Rock Storage Areas	421	569	990	421	569	990
Heap Leach Pads	360	198.5	558.5	360	198.5	558.5
Crushing/Mill/Plant Facilities[2]	42	17	59	42	7	49
Tailings Impoundment	0	234	234	0	234	234
Process Ponds	17	4	21	17	4	21
Storm Water Ponds	6.5	3	9.5	6.5	3	9.5
Growth Media Stockpiles	15	43	58	15	43	58
Haul Roads/Access Roads	63	77	140	49	64	113
Water Supply System	15.1	18.9	34	15.1	18.9	34
Diversion Ditches/Creek Diversions[3]	14.1	19.9	34	0	0	0
Exploration Drill Pads and Roads	17	25	42	17	25	42
Infill/Miscellaneous Areas	102.5	73.5	176	102.5	73.5	176
Total Acreage	**1,561.2**	**1,743.8**	**3,305**	**1,478.1**	**1,485.9**	**2,964**

[1]Total of currently permitted and proposed disturbances.
[2]Although these facilities are not proposed to be reclaimed, the reclamation bond includes full reclamation cost estimates for these facilities.
[3]Diversions will be permanent features as part of the stabilization at facilities.

equipment to create a friable surface with favorable bulk density. Other grading and stabilization would be performed to ensure long-term stability. Growth media would then be distributed over the prepared surface at varying depths, depending on the facility being reclaimed. Soil amendments would be applied as needed, and the surface disked, raked, or treated to incorporate the amendments into the top four to six inches of growth media.

2.2.17.4 Seed Mixtures and Rates

The proposed seed mixtures (Table 2-7) that would be used to revegetate disturbance areas are based on pre-mining vegetation and habitat types in the area, climatic and soil conditions of the Project Area, and seed availability. The final selection of seed mixes would depend on the results of site-specific reclamation studies and commercial availability of seed. Commercial certified weed-free seed would be purchased from local sources, if possible.

Revegetation activities would be conducted in the fall to take advantage of winter moisture. On steep slopes and in rocky areas, broadcast seeding would be used for seed application. Broadcast or drill seeding would be employed on level to gently sloping areas where coarse fragment content is low.

2.2.17.5 Weed Control

Weed control measures would be implemented during vegetation establishment in order to limit the spread of noxious weeds and to ensure that the site is successfully reclaimed with desirable species. GMMC would coordinate noxious weed controls with the BLM. Noxious weed occurrences within the reclaimed areas would be reported to the BLM, and an

Table 2-7: Proposed Seed Mixes[1]

Scientific Name	Common Name	Seeding Rate (PLS lbs/acre)[2]	
		Interim Seed Mix[3]	Reclamation Seed Mix
GRASSES			
Agropyron desertorum	Crested wheatgrass	7.0	--
[4,5]*Sitanion hystrix*	Bottlebrush squirreltail	--	2.5
[4,5]*Pseudoroegneria spicata* ssp. *spicata*	Bluebunch wheatgrass (var. Secar)	--	2.0
[4,5]*Leymus cinereus*	Great Basin wildrye	--	2.0
[5]*Oryzopsis hymenoides*	Indian ricegrass	--	2.5
FORBS			
[5]*Sphaeralcea coccinea*	Scarlet globemallow	--	0.5
[4]*Linum lewisii*	Blue flax	--	0.5
[4]*Achilliea millefolium*	Western yarrow	--	0.5
SHRUBS			
[4,5]*Atriplex canescens*	Fourwing saltbush	--	3.0
[5]*Atriplex confertifolia*	Shadscale	--	3.0
[5]*Ceratoides lanata*	Winterfat	--	0.5
[4]*Artemisia tridentata* spp.*wyomingensis*	Wyoming big sagebrush	--	0.25
Total lbs/acre		**7.0**	10.75[5] *to* 16.0[4]

[1]Seed would be tested for noxious weed seeds prior to application.
[2]PLS = Pure live seed (pounds per acre).
[3]Soil stockpiles, road berms, and/or other temporary facilities.
[4]Species to be used at the upper elevation sites that currently support a sagebrush community.
[5]Species to be used at the lower elevation sites that currently support a shadscale community.

appropriate eradication plan would be developed. If herbicides are used to control noxious weeds, the application rates and methods would conform to BLM standards, thereby avoiding potential risks to human health.

2.2.17.6 Reclamation Schedule

At the conclusion of operations, reclamation would be initiated at the earliest feasible time. Removal of facilities, rough grading, and scarifying activities may occur at any time during the project. Concurrent reclamation of select disturbed areas has been performed and may continue at any time until mine closure. Post-mining reclamation would be initiated when ore reserves have been exhausted and mining operations cease.

Soil distribution and revegetation activities are limited by the time of year during which they can be effectively implemented. General scheduling of revegetation activities would include:

- Grading, drainage control, and maintenance that would be conducted year-round;
- Seedbed preparation in early fall just prior to reseeding; and
- Completion of seeding in fall to winter in order to take advantage of winter and spring moisture.

Table 2-8 outlines the anticipated revegetation schedule, which would be followed during the life of the mine and five years beyond mine closure to achieve the reclamation goals. Site conditions and/or yearly climatic variations may require modifications to the revegetation schedule.

2.2.17.7 Facility Reclamation

Reclamation procedures, as outlined in GMMC's currently approved PoO (GMMC 2001) would be used for reclamation of the various components included in the proposed mine expansion. Reclamation of these facilities is discussed below.

Table 2-8: Reclamation and Re-Seeding Schedule

Reclamation Activity	Optimal Months											
	J	F	M	A	M	J	J	A	S	O	N	D
Regrading												
Soil Distribution												
Seedbed Preparation and Seeding												

Facility removal could occur year-round.

Open Pit

The primary goals for reclamation of the open pits would be to ensure long-term stability of the final configurations and public safety. For the pits that would not be backfilled, pit walls would gradually ravel and slough over time to the natural angle of repose for the individual rock types. Pit bottoms would be ripped and seeded to encourage absorption of precipitation. Pits that would be partially backfilled would have the near horizontal surfaces of the in-pit backfill reclaimed similar to reclamation of the out-of-pit waste rock storage areas. Growth media would be applied and the areas subsequently seeded with an appropriate seed mix to create an ET storage and release cover. A perimeter berm with warning signs would be placed around the pits during reclamation with a sufficient setback to accommodate the projected, final pit crest. Pits would be bermed and fenced as approved by BLM and the NDEP, taking into consideration the Nevada Division of Minerals ranking system. Pits that would be completely backfilled and have additional waste rock surface applied to create a waste rock storage facility, would be reclaimed as a waste rock storage facility (see below).

Road beds in and around the pit areas and pit floors would be rebladed and ripped and/or scarified to prepare a seedbed or a surface for application of growth media; the area to be reclaimed would depend on engineering feasibility and safety considerations. The prepared surfaces would subsequently be seeded with an appropriate seed mixture.

Waste Rock Storage Areas

Prior to reclamation, the waste rock storage areas would be recontoured, regraded to overall slope angles of 3H:1V, and crowned to prevent water from ponding. Perimeters would be irregular to allow blending with the existing topography and to break up long, linear features. Large boulders would be placed on the ridges or benches to provide wildlife habitat. All flat benches and other areas of the storage area with recontoured slopes accessible by heavy machinery would be ripped and/or scarified to produce a rough surface for anchoring of reapplied growth media. Growth media would be applied to the side slopes as well as the top surfaces of the waste rock storage areas to a depth of a minimum, of six inches. These areas would be reseeded with an appropriate seed

mixture. The growth media and vegetation would create an ET cover to reduce infiltration of meteoric water into the waste rock storage facilities, decreasing the potential for mobilization of metals or other constituents of the waste rock.

Processing Facilities

Processing facilities would be decommissioned following the completion of ore processing. Equipment, electrical facilities, instrumentation, aboveground piping, miscellaneous fencing, and mobile and permanent structures would be removed from the site in accordance with appropriate federal and state regulations. Foundations would be broken up and buried in place prior to growth media application and seeding.

Heap Leach Pads

GMMC proposes to stabilize the heap leach pads (existing and proposed) by constructing an ET cover system over the spent heaps. The purpose of the ET cover system is to reduce the amount of meteoric water infiltrating the heap leach materials. A reduction in infiltration would reduce drain down solutions, decreasing the potential for drain down solutions to degrade waters of the State, as defined in NAC 445A.430. GMMC would be responsible for monitoring discharge effluent for a minimum of five years and up to 30 years, as directed by NDEP-BMRR, to establish that the drain down solutions would not degrade waters of the state. BLM's closure policy and guidelines for heap leach facilities has been provided in Appendix B.

The heaps would be leached until economic recovery has been achieved. Following leaching, the liner and drain pipes would be left under the heaps. The heaps would be allowed to drain, with ongoing monitoring of drain down quantity and quality to establish compliance of key constituents (weak acid dissociable [WAD] cyanide and pH) in the drain down solutions. The drain down solution would be managed to promote evaporation by recirculating drain down solution onto the side slopes of the heap using a fogger system designed to facilitate evaporation. The ponds would also continue to collect solution and promote evaporation. The recirculation-evaporation would continue until the drain down volume begins to stabilize.

The heaps would be re-sloped to an overall slope of 3H:1V to eliminate catchment benches with all spent ore material maintained on existing and cushioned liner systems. Drainage to the collection system would be maintained. GMMC would place a minimum of one-foot of growth media on the heaps. The growth media would be waste rock, identified through cover system modeling and waste characterization tests, as being suitable for use as cover material. The waste rock material would be selected and re-handled in a manner to provide sufficient coarse fraction to form resistance to erosion and sufficient fines to hold meteoric water for use in revegetation. No additional growth media placement is anticipated based on the successful revegetation of the 8-South Waste Rock Storage Area with similar waste rock material and the infiltration modeling results of the ET cover (Hydro-Engineering 2002). This layer would serve as an ET cover that would hold and release incident precipitation and limit meteoric water infiltration through the cover and into the heaps. The covered heaps would be revegetated to promote evapo-transpiration of meteoric waters as well as interstitial solutions within the heaps.

Heap drain down solutions would be managed in passive water treatment facilities consisting of either wetland-woodland facilities or attenuation/ET basins. The optimal method to treat the heap drain down solution would be determined by the chemistry and volume of this solution. The wetland-woodland system, designed to accentuate evapotranspiration, would be constructed at the Marigold, 5-North, Section 30, and Section 16 Heap Leach Facilities. The wetland-woodland system would be created on a liner system of the process solution ponds (and storm water pond as needed) to contain solution, and have sufficient growth material for the plant life form required for the design parameters.

The wetland-woodland system would be designed to accommodate the anticipated long-term drain down, as determined during the heap closure process, and any meteoric water that may infiltrate the ET cover system. Similar systems have been used at Glamis Dee Gold Mine in Elko County and Glamis Daisy Gold Mine in Nye County, Nevada. The system would be designed for normal variation in precipitation (i.e.,

would take into account normal yearly precipitation fluctuations) and to minimize infiltration.

In the event that drain down monitoring data indicates that volume of the long-term drain down exceeds projections, construction of one or more evapotranspiration basins (ET basins) is necessary. The ET basin(s) would either be in addition to or in place of the wetland-woodland water treatment facility. If the ET basins are constructed in lieu of the wetland-woodland system, then the process solution and storm water ponds would be available for use as the ET basins. If the ET basin(s) is constructed in addition to the wetland-woodland system, then one solution pond would be used for the wetland-woodland and the other solution pond and/or storm water pond would be used for the ET basin(s).

The pond(s) would be cleaned of residual sludge. The pond liners would be left in place and protected with a cover of geotextile fabric and/or soil. The pond(s) would then be backfilled with soils to a level below the drain down point to allow for drainage to filter across the pond. Perforated pipe would used to distribute the drain down across the backfilled pond(s) to promote a broad infiltration area. The soils would be selected to accentuate attenuation of solution constituents. The pond(s) would then be backfilled with growth medium and seeded. A vertical piezometer would be installed during construction to monitor solutions levels within the pond(s), as well as solution chemistry. Glamis Gold Ltd. has constructed a similar agency-approved attenuation basin at the Glamis Daisy Gold Mine in Nye County, Nevada.

The wetland-woodland system alone, or the wetland-woodland system in combination with the ET basin(s) would be designed to accommodate all normal (i.e., long-term drain down and natural variation in precipitation events). As such, the facility would be designed as a zero-discharge facility. However, as a contingency for exceptional, unforeseen events, a leach field would be designed to accommodate volume that may exceed the capacity of the wetland-woodland system. The leach field system would be located near the process ponds in each heap leach area. The relatively deep groundwater table makes these sites suitable for leach fields, provided the surrounding materials have attenuating capacity for constituents in the overflow.

The leach fields would be constructed by excavating surface soils to a depth of five feet, of which two feet would be backfilled with coarse gravel to promote drainage. A manifold would be placed in the leach field to distribute flow across two or three perforated HDPE distribution pipes placed over the coarse gravel. The distribution pipes would be covered with an additional foot of gravel, which would be covered with the remaining excavated soil. The surface of the leach field would be graded to promote runoff of meteoric waters. Overflow from the wetland-woodland system or the ET basins would be conveyed via HDPE pipe to a dosing tank at the head of the leach field. The dosing tank would release approximately 100 gallons of effluent at a time to the manifold to achieve uniform distribution.

The intent of the heap leach pad closure is to continue the facilities as zero-discharge facilities, but they would also include a contingency for exceptional events. The contingency would be designed to prevent degradation of waters of the state.

Process Solution Ponds

The process solution ponds may be used as part of the passive water treatment for closure of the heap leach facilities, in which case, the ponds would be used as evapotranspiration basins (see above). In the event that treatment of the heap leach drain down is not necessary, the process solution ponds would be reclaimed. Reclamation of the process solution ponds and water storage ponds would consist of draining, removal or perforation and burial in place of the synthetic liners, reshaping, seedbed preparation, and seeding. Following evaporation of all liquid from the ponds, any sludges in the ponds would be analyzed using both the MWMP and the Toxicity Characterization Leaching Procedure (TCLP). If the results are within the limits as defined by each procedure, the synthetic liners would be folded around the evaporate and buried in-place five feet below the surface. In the event that the test results are not within limits as defined by each procedure, the evaporate would be removed and disposed of in accordance with state and federal regulations, or stabilized and buried on-site.

All pond sites and ditches would be filled and recontoured to prevent ponding of runoff and allow for natural drainage. The pond areas would be graded and contoured to blend in with the natural topography. The prepared surfaces would be scarified and reseeded.

Roads, Drill Pads, and Sumps

All roads and drill pads within the Project Area would be ripped, scarified, and revegetated, following the completion of mining, unless designated as a county road. Roads would be contoured as near as possible to the surrounding terrain. Sumps would be filled prior to seeding. All culverts and other water diversion structures would be removed and the natural drainage patterns restored. Water bars or other structures may be left in place to reduce any undue erosion. The prepared surfaces would be seeded with an appropriate seed mix.

Removal of Stored Fuels, Chemicals, and Blasting Supplies

Fuels, chemicals, and blasting supplies would be consumed prior to the end of mining, if feasible. Remaining inventories would be returned to vendors or removed and properly disposed of off-site.

Exploration Drill Hole Abandonment

All exploration drill holes completed after April 9, 1990, have been plugged according to standards stipulated by the NRS 534.421 through NRS 534.428. Any additional drill holes resulting from ongoing exploration also would be plugged according to these requirements.

Ancillary Facilities

Prior to decommissioning of mine facilities, GMMC would modify the existing detailed closure plan for Glamis Marigold Mine to include the decommissioning of the Millennium Expansion Project facilities and submit the modified plan to NDEP-BMRR for approval. Structures would be properly removed and/or buried. Following removal or burial, the ground surface would be recontoured, prepared, and seeded. Disposition of other project components on public grounds would consist of:

- Fresh water rinsing or active treatment of any piping which contained cyanide solutions;
- Concrete foundations would be broken-up and buried in place;
- Buried piping and conduits would be drained, rinsed, capped or sealed, as needed, and buried in place;
- Scrap metal, trash, and other non-hazardous debris would be placed in the existing waivered-Class III landfill or disposed of off-site at an appropriate facility; and
- All power lines and electrical systems not required for future post-mining use would be removed.

Facilities Not Reclaimed

The following components would not be subject to post-mining reclamation:

- Main access road from the Buffalo Valley Road;
- Certain buildings and structures located on private property in Section 9;
- Fencing to protect evapotranspiration facilities;
- Electric power lines or equipment necessary for post-mining uses; and
- Water wells, water lines or other utilities required for post-mining uses.

2.3 Alternative 1 –Trout Creek Diversion Realignment

Trout Creek was originally diverted to permit mining of the 8-South Pit and construction of the 8-South Waste Rock Storage Area. The stabilization of the diversion has been previously analyzed in the Resort EA (BLM EA # N26-88-005P) and March 2001 FEIS with respect to the Red Rock Pit. The analysis identified concerns with the long-term stability and potential

failure of the west highwall in the Red Rock Pit, which could result in flow from Trout Creek entering the Red Rock Pit.

The proposed consolidation of the Red Rock and Top Zone pits into the Terry Zone Pit by combining and deepening of portions of the two pits has created concern over the long-term stabilization of the Trout Creek Diversion/Red Rock Pit high wall. The issues associated with this alternative are:

- Pit high wall stabilization;
- Groundwater quality (potential to degrade waters of the state); and
- Surface water quantity (maintenance of ephemeral flows downstream of the diversion).

This Alternative is the same as the Proposed Action except for the additional disturbance associated with the Trout Creek Diversion Realignment. All other components of the Proposed Action are part of this Alternative.

Under this Alternative a new diversion channel would be constructed with the diversion point located in the SW ¼ of T33N, R43E, Section 19. The diversion would parallel the existing Trout Creek channel and eventually flow into the north end of the existing Trout Creek Diversion. The new diversion channel would be 100 to 200 feet west of the existing channel and excavated into bedrock. To achieve the required channel elevation and stream gradient, the new diversion would need to be excavated into the side of a small hill in the NW ¼ of Section 19. The new channel would be approximately 2,300 feet in length. The depth and width would vary depending final design of the diversion and the amount of excavation required to achieve the proper channel elevation while maintaining 3H:1V side slopes. The new diversion would be designed to accommodate the 100-year, 24-hour event within the constructed channel. Approximately 12 acres of disturbance would be associated with the new channel diversion (Figure 2-11, 2-12). The diversion would generally have a trapezoidal shape (Figure 2-9) similar to the storm water diversion structures, and would be armored with rip rap along alignments with flows that exceed a velocity of four fps. Native material would be used for the portions of the channel where flow is anticipated to be less than four fps. The average diameter (D50) of the rip rap would be based on the design criteria for the 100-year, 24-hour storm event.

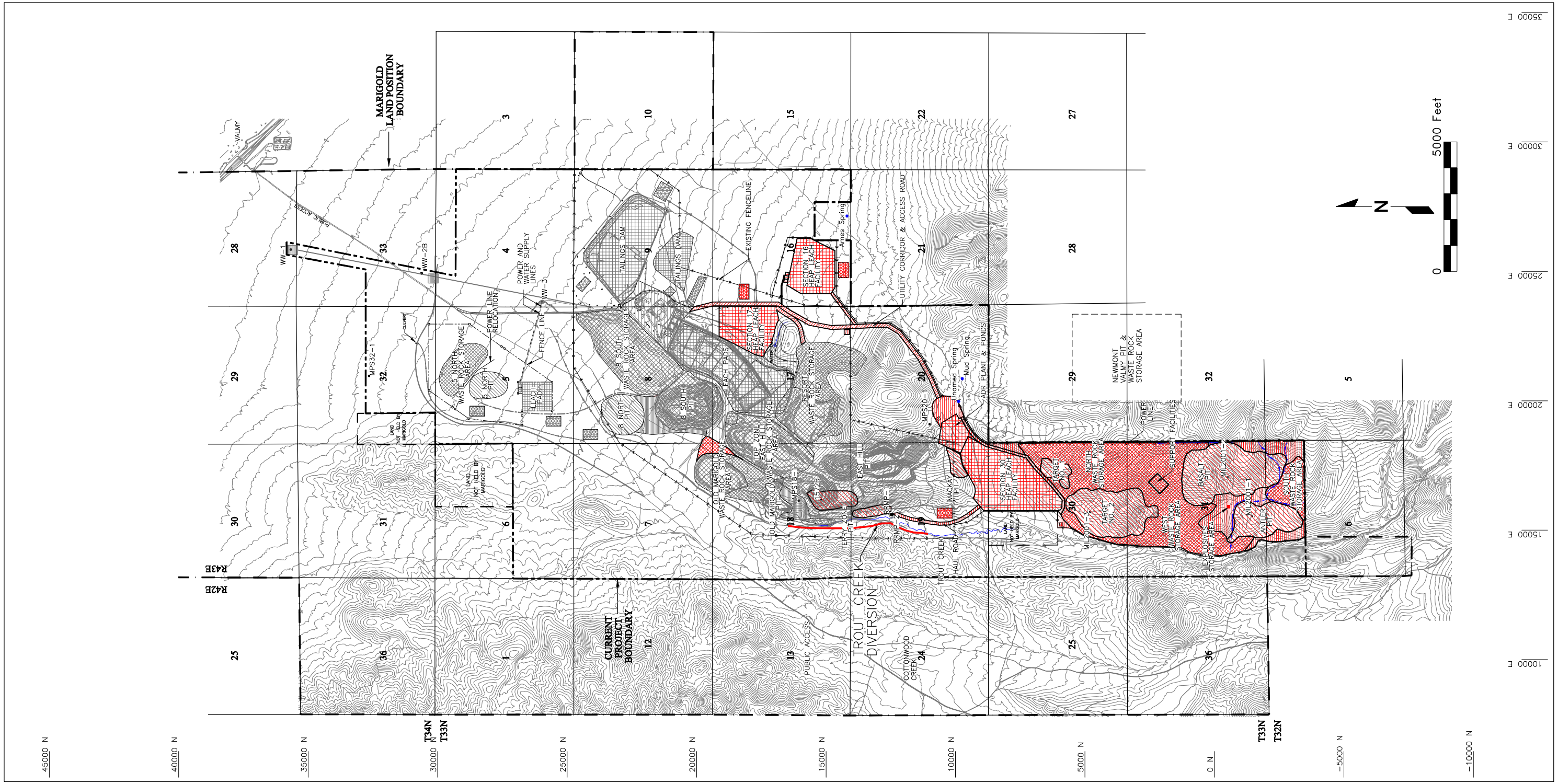
A summary of reclamation acreages by project facility for Alternative 1 is presented in Table 2-9 and post-reclamation topography is displayed in Figure 2-13.

2.4 Alternative 2 - Expanded Red Rock Pit Stabilization

This Alternative is also intended to address the same issues identified in Alternative 1. The upper portion of the west highwall of the Red Rock Pit/Terry Zone Pit consists predominately of alluvium material. The previous NEPA analysis resulted in the development of a backfill buttress of the west highwall as mitigation and an environmental protection measure with regard to the potential impacts to the stability of the alluvium material from raveling or seepage from the Trout Creek Diversion. The purpose of the buttress is to increase the stability of the west highwall against potential failures from pit wall raveling or seepage from the Trout Creek Diversion which is located approximately 100 to 200 feet west of the Red Rock Pit highwall crest.

This Alternative is the same as the Proposed Action except for the expanded pit backfill/buttress that would be constructed to prevent Trout Creek from flowing into the pit. All other components of the Proposed Action are part of this Alternative.

Under this Alternative the authorized buttress would be expanded to provide additional long-term stability. The expanded buttress would consist of backfilling the west side of the Red Rock Pit to an elevation ten feet above the west pit crest and ten feet beyond the pit footprint along the entire length of the west highwall (Figure 2-14). Run of mine material would be backfilled into the pit to form the buttress. The buttress would be designed to divert or withstand the flow from the 100-year, 24-hour event. The backfill would be graded to approximately 3H:1V within the pit

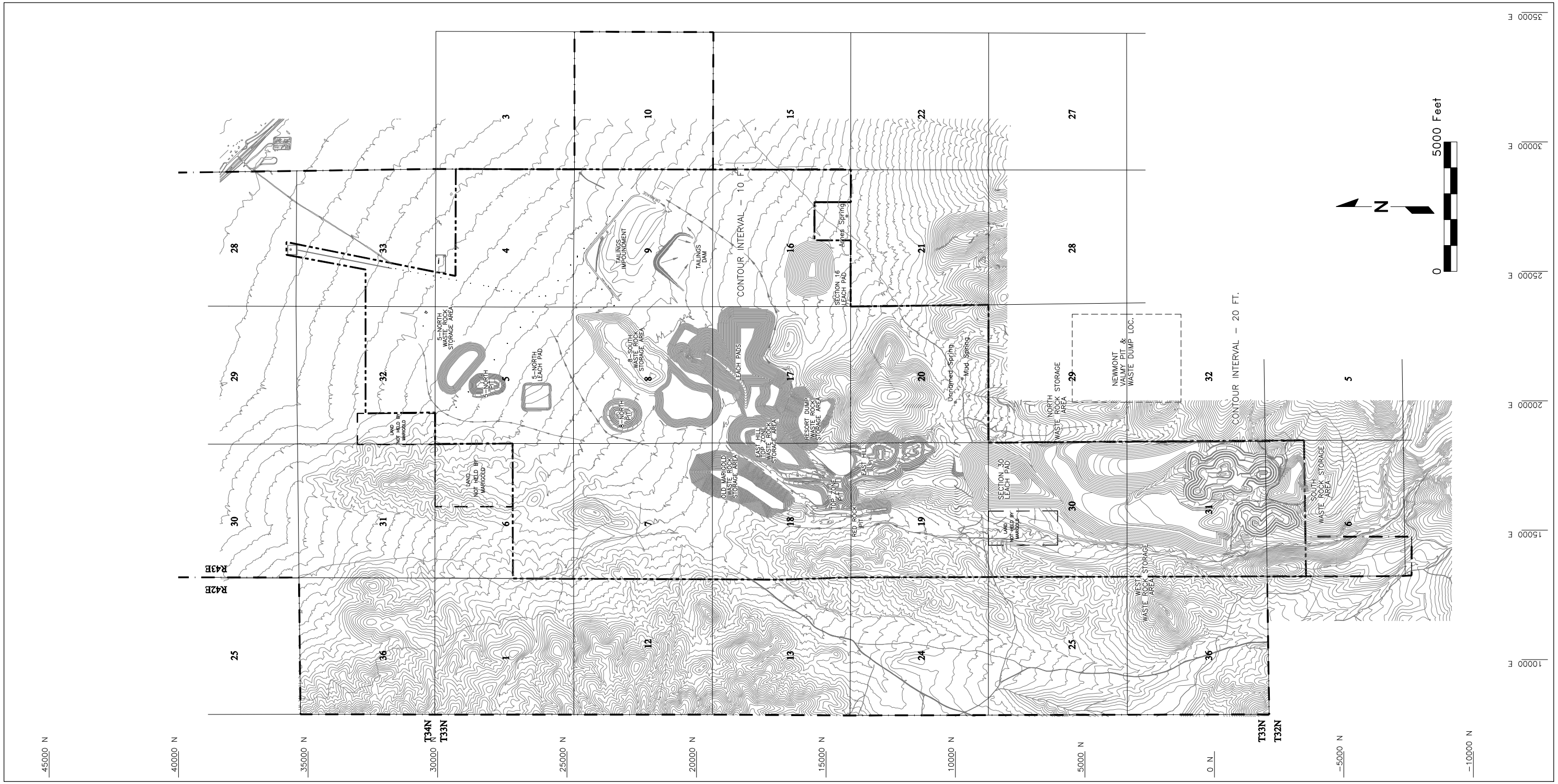


Millennium Expansion Project

Figure 2-11

Alternative 1

Trout Creek Diversion Realignment



LEGEND

- SURFACE WATER DIVERSION
- PRIVATE LAND/PUBLIC LAND CLAIM BOUNDARY
- EXISTING PERMIT BOUNDARY

Millennium Expansion Project

Figure 2-12

Alternative 1
Post Reclamation Topography

Table 2-9: Acreages Disturbed and Reclaimed After Alternative 1

Facility	Disturbed Acres[1]			Reclaimed Acres		
	Public Land	Private Land	Total	Public Land	Private Land	Total
Pits	488	461	949	433	246	679
Waste Rock Storage Areas	421	569	990	421	569	990
Heap Leach Pads	360	198.5	558.5	360	198.5	558.5
Crushing/Mill/Plant Facilities[2]	42	17	59	42	7	49
Tailings Impoundment	0	234	234	0	234	234
Process Ponds	17	4	21	17	4	21
Storm Water Ponds	6.5	3	9.5	6.5	3	9.5
Growth Media Stockpiles	15	43	58	15	43	58
Haul Roads/Access Roads	63	77	140	49	64	113
Water Supply System	15.1	18.9	34	15.1	18.9	34
Diversion Ditches/Creek Diversions[3]	21.1	24.9	46	0	0	0
Exploration Drill Pads and Roads	17	25	42	17	25	42
infill/Miscellaneous Areas	102.5	73.5	176	102.5	73.5	176
Total Acreage	**1,568.2**	**1,748.8**	**3,317**	**1,478.1**	**1,485.9**	**2,964**

[1]Total of currently permitted and proposed disturbances.
[2]Although these facilities are not proposed to be reclaimed, the reclamation bond includes full reclamation cost estimates for these facilities.
[3]Diversions will be permanent features as part of the stabilization at facilities.

and 2H:1V on the Trout Creek side of the buttress (i.e., the portion that would be resloped and extend beyond the pit footprint). The buttress would have a crest width of 30 feet after re-sloping to 3H:1V, growth media would be placed and reseeded. Approximately three to four million tons of waste rock material would be necessary to create the extended buttress. Backfill material would be subject to the constraints that have been applied to backfilling the other mine pits.

A summary of reclamation acreages by project facility for Alternative 2 is presented in Table 2-10 and the post-reclamation topography is displayed in Figure 2-15.

2.5 Alternative 3 - No Action Alternative

Under the No Action alternative, currently permitted operations at the Glamis Marigold Mine would cease after 2007, with final reclamation extending approximately ten years beyond closure. Additional mineral resources in the Project Area would remain undeveloped, and no construction or expansion of mine pits, waste rock storage areas, heap leach pads, or other ancillary facilities would occur. A summary of reclamation acreages by project facility for the No Action Alternative is presented in Table 2-11. Post-reclamation topography for this alternative is illustrated in Figure 2-16.

2.6 Alternatives Considered but Eliminated from Detailed Analysis

In the process of developing the PoO Modification, GMMC considered various environmental constraints in relation to the placement and construction of facilities. These constraints included locations of known cultural sites, surface water locations, visual contrasts, depth to groundwater, and wildlife resources. In addition to environmental constraints, GMMC also had to consider land status and operational constraints. These alternatives included:

1) *Creating a waste rock storage area on the west side of Trout Creek in Section 31*.

This alternative was eliminated from further consideration due to the existence of cultural sites west of Trout Creek and because of the potential impacts to surface waters during the periods of flow in Trout Creek. Construction and operation of a crossing over the Trout Creek Diversion increases the risk of impacts to surface water quality from sedimentation during periods of flow. The crossing would also be at risk during any period that the design flow event is exceeded. Potential impacts for this scenario would include increased sedimentation to failure of the crossing resulting in impacts to surface water and operational downtime. Condemnation drilling results and haul distances also precluded this alternative from further consideration.

Configuring waste rock storage areas onto adjacent mining properties to effect a synergy for reclamation.

Section 30 includes 80 acres of private land not owned or controlled by GMMC. Newmont Mining Corporation (NMC) controls and/or owns lands east of Sections 30 and 31. Configuring waste rock storage areas onto adjacent mining properties to affect a synergy for reclamation was not considered a viable alternative. Each mining company has a different set of circumstances that govern mine planning and operations. These circumstances, such as differing ore grades, haul distances, operational costs, and scheduling, make this alternative impractical to implement as long-term plans for both mining companies would necessarily change as the price of gold changes. Bonding issues further complicate the ability to combine facilities.

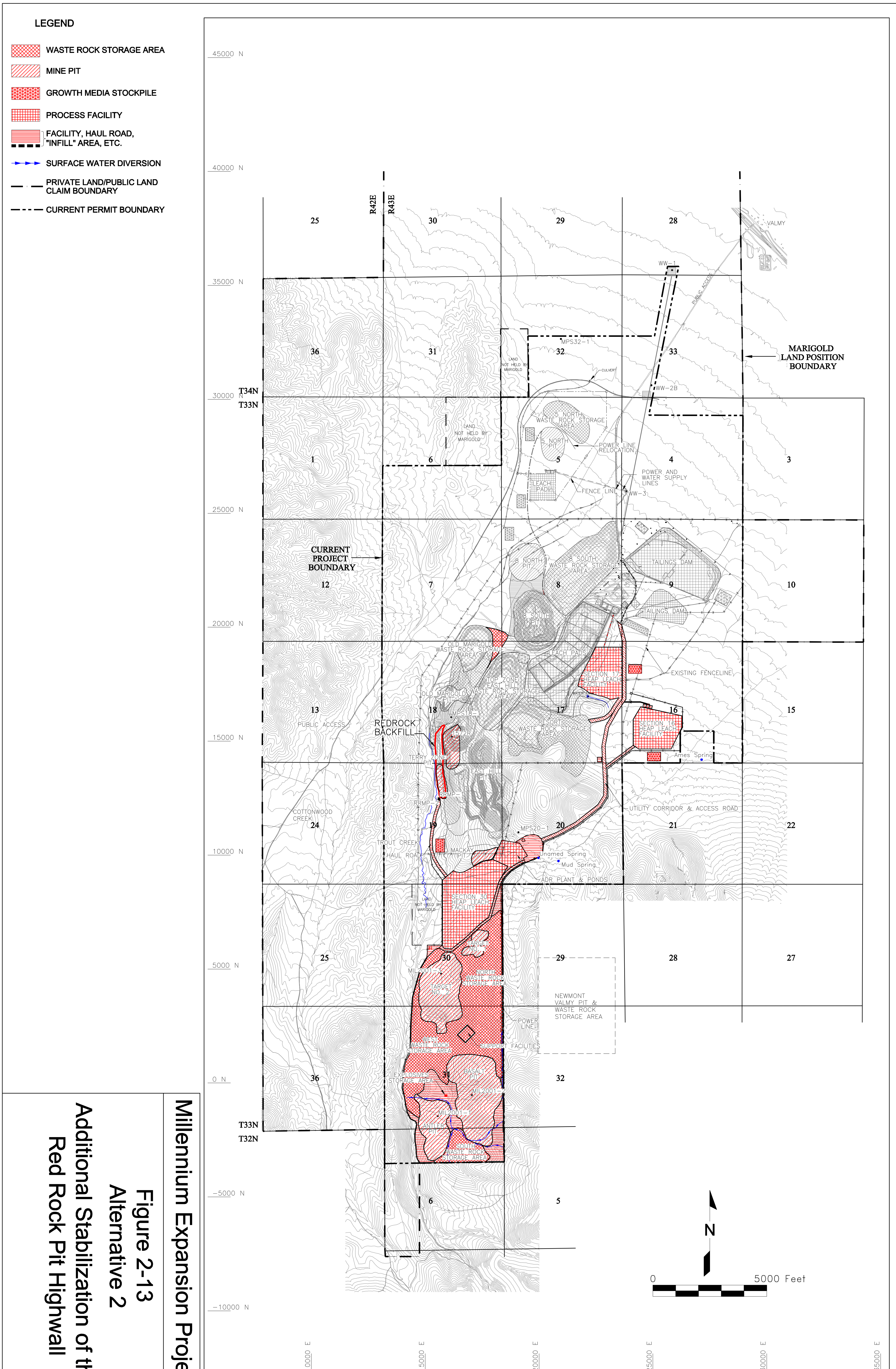


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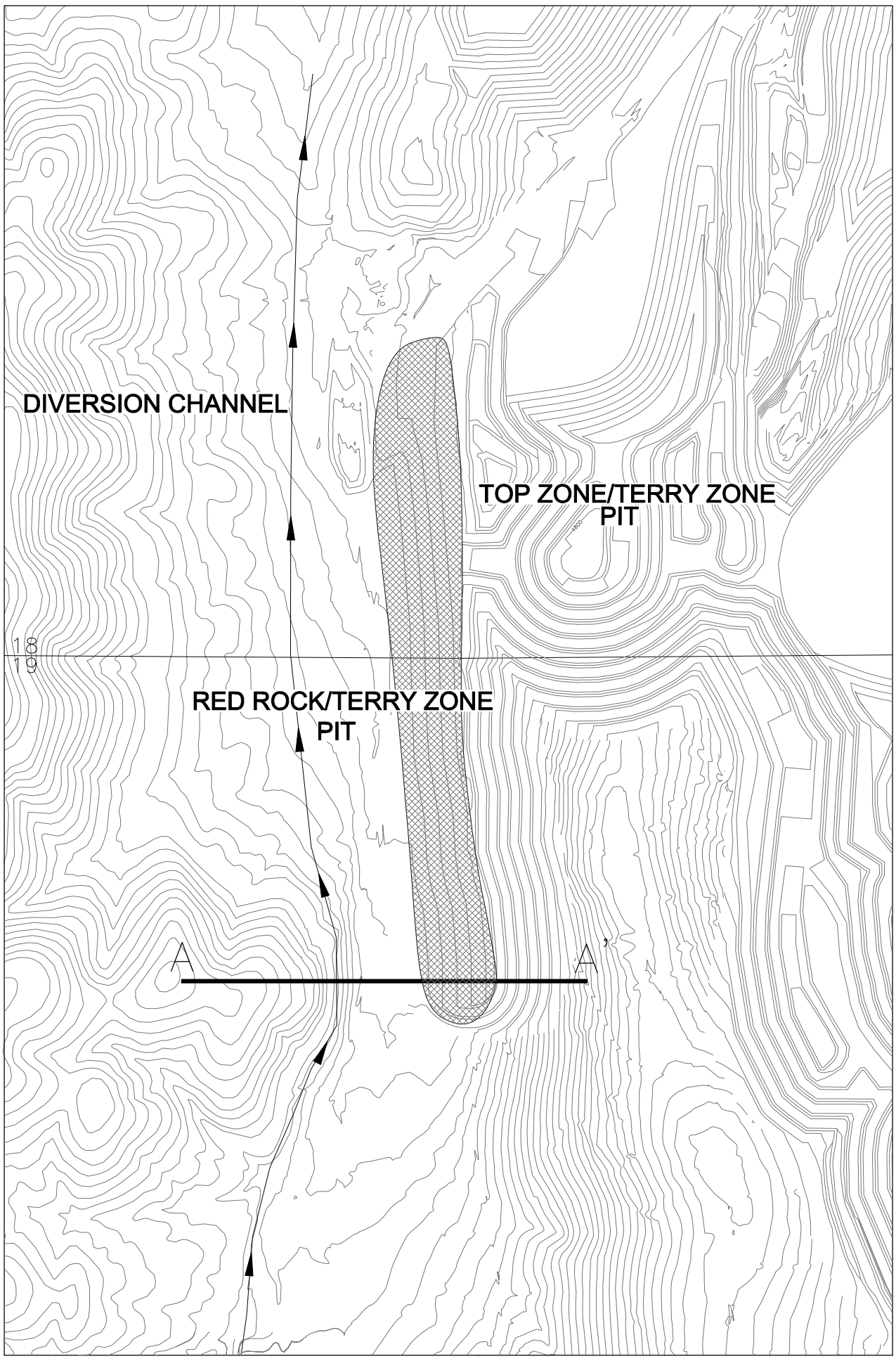
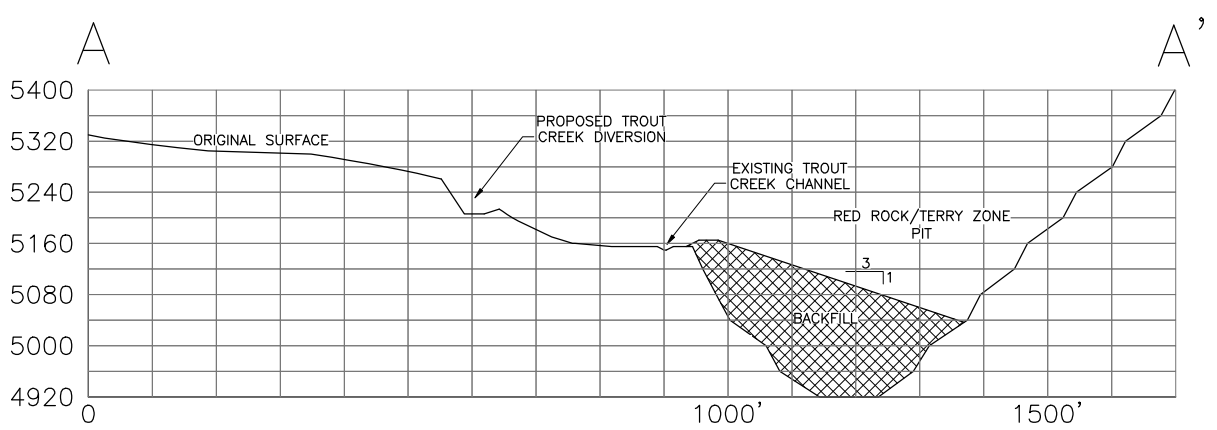
Figure 2-13
Alternative 2
Additional Stabilization of the
Red Rock Pit Highwall





NOT TO SCALE

Millennium Expansion Project

Figure 2-14

Cross-Section Alternative 2

Table 2-10: Acreages Disturbed and Reclaimed After Alternative No. 2

Facility	Disturbed Acres[1]			Reclaimed Acres		
	Public Land	Private Land	Total	Public Land	Private Land	Total
Pits	488	461	949	433	246	679
Waste Rock Storage Areas	421	569	990	421	569	990
Heap Leach Pads	360	198.5	558.5	360	198.5	558.5
Crushing/Mill/Plant Facilities[2]	42	17	59	42	7	49
Tailings Impoundment	0	234	234	0	234	234
Process Ponds	17	4	21	17	4	21
Storm Water Ponds	6.5	3	9.5	6.5	3	9.5
Growth Media Stockpiles	15	43	58	15	43	58
Haul Roads/Access Roads	63	77	140	49	64	113
Water Supply System	15.1	18.9	34	15.1	18.9	34
Diversion Ditches/Creek Diversions[3]	14.1	19.9	34	0	0	0
Exploration Drill Pads and Roads	17	25	42	17	25	42
infill/Miscellaneous Areas	102.5	73.5	176	102.5	73.5	176
Total Acreage	**1,561.2**	**1,743.8**	**3,305**	**1,478.1**	**1,485.9**	**2,964**

[1]Total of currently permitted and proposed disturbances.
[2]Although these facilities are not proposed to be reclaimed, the reclamation bond includes full reclamation cost estimates for these facilities.
[3]Diversions will be permanent features as part of the stabilization at facilities.

Table 2-11: Acreages Disturbed and Reclaimed After the Alternative 3

Facility	Disturbed Acres[1]			Reclaimed Acres		
	Public Land	Private Land	Total	Public Land	Private Land	Total
Pits	324	211	535	0	0	0
Waste Rock Storage Areas	343	296	639	343	296	639
Heap Leach Pads	56	152	208	56	152	208
Crushing/Mill/Plant Facilities[2]	35	18	53	35	8	43
Tailings Impoundment	0	234	234	0	234	234
Process Ponds	5	2	7	5	2	7
Storm Water Ponds	1.5	4.5	6	1.5	4.5	6
Growth Media Stockpiles	10	38	48	10	38	48
Haul Roads/Access Roads	36	52	88	22	39	61
Water Supply System	4	9	13	4	9	13
Diversion Ditches/Creek Diversions[3]	13	18	31	0	0	0
Exploration Drill Pads and Roads	17	25	42	17	25	42
Infill/Miscellaneous Areas	51.5	22.5	74	51.5	22.5	74
Total Acreage	**896**	**1,082**	**1,978**	**545**	**830**	**1,375**

[1]Total of currently permitted and proposed disturbances.
[2]Although these facilities are not proposed to be reclaimed, the reclamation bond includes full reclamation cost estimates for these facilities.
[3]Diversions will be permanent features as part of the stabilization at facilities.

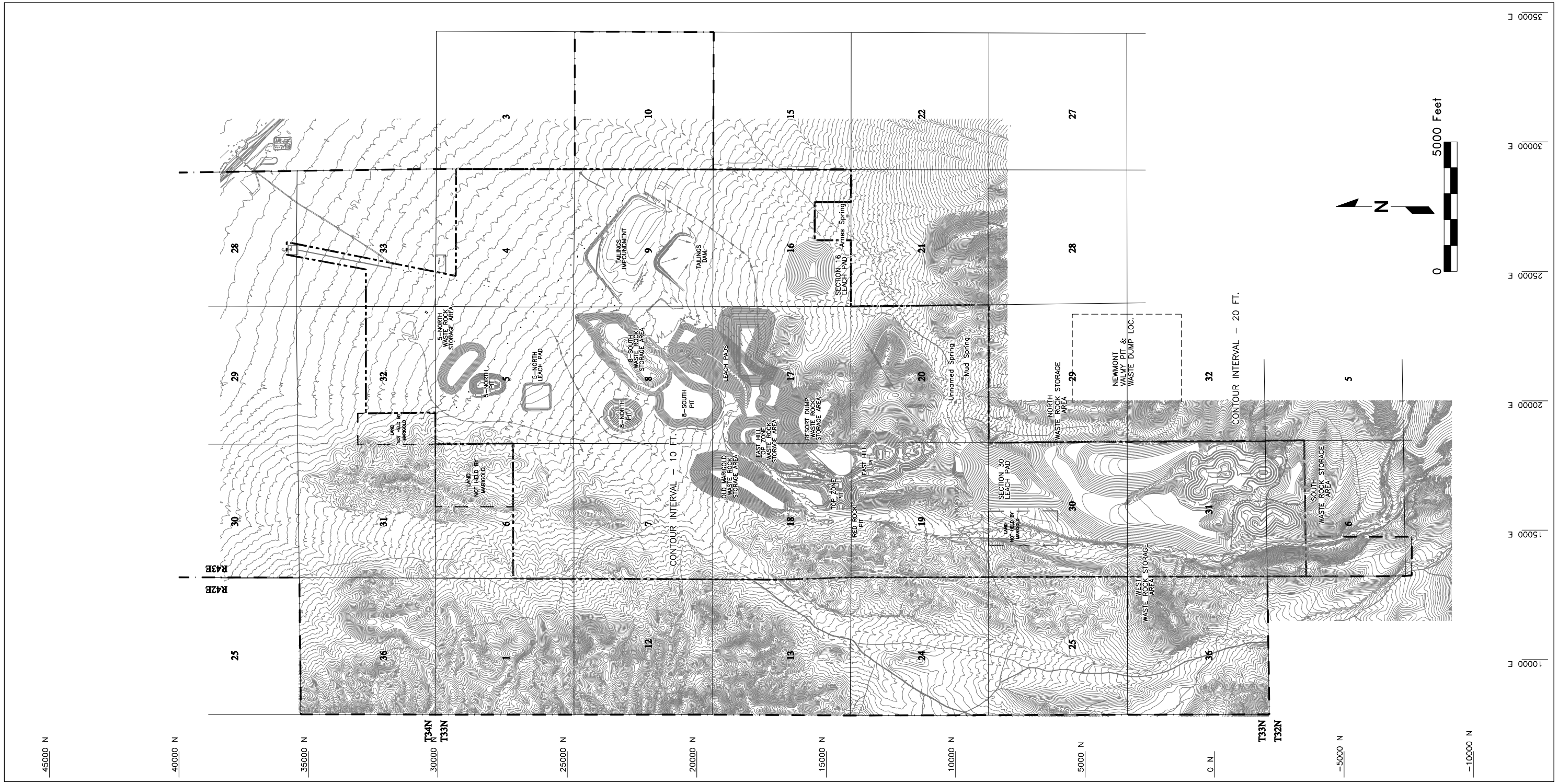


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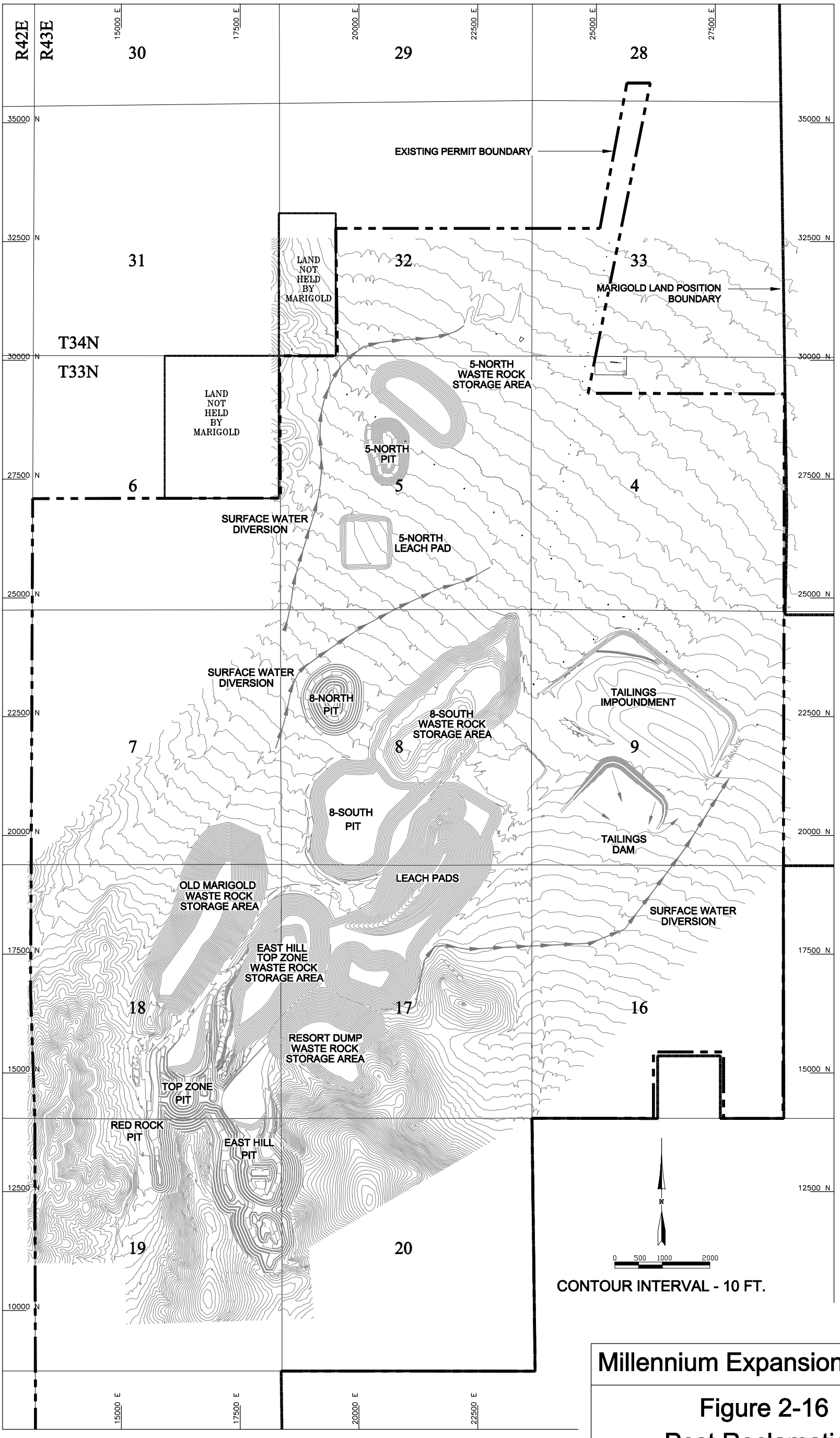
Figure 2-15
Alternative 2
Post Reclamation Topography



Millennium Expansion Project

Figure 2-16

Post Reclamation Topography Under The No Action Alternative

BLM and NDOW identified the following alternatives:

1) *Combining the Section 16 and 30 heap leach facilities into one large facility in Section 30*.

   Both heap leach pads are designed to hold the ore removed from the proposed pits. Pad designs minimize the liner surface area while maximizing the height of the ore. The ultimate height of the stacked ore is constrained by the pad size and the final reclamation slope requirement of 3H:1V. The size of the Section 30 Heap Leach Pad is constrained to the west in Section 30 by property ownership. In addition, higher lifts decrease operational efficiency by increasing the elevational difference between the level at which the ore is mined (i.e., deeper in the pit) and the level at which the ore is processed (i.e., higher on the leach pad). Increasing the volume of ore on the heap leach pad also increases the time needed for drain down at the time of closure. The Section 30 Heap Leach Pad would have insufficient capacity to hold the amount of ore scheduled to be placed on Section 30 and Section 16 Heap Leach Pads.

2) Underground mining of ore.

   The ore is sufficiently disseminated between near surface and at depth to make underground mining unfeasible.

3) *Heap leach pads constructed over backfilled pits*.

   Constructing heap leach pads over backfilled pits was considered and eliminated from further detailed analysis. Although this alternative would create less new surface disturbance, the risk to surface and groundwater quality would be substantially increased. The backfill in the pits would undergo differential settling during pad construction and loading which would increase the potential for tearing the liner and releasing solution to the environment.

4) *Potential backfilling of the Valmy Pit.*

   The Valmy Pit is currently being mined by NMC. This alternative was not feasible given the time constraints for permitting at the Glamis Marigold Mine. This alternative would require agreement with NMC, and would depend on the ore grade within the pit walls and floor, as well as NMC's future plans for the Valmy Pit.

5) *Elimination of the Section 30 Heap Leach processing ponds and ADR plant by piping the leachate to the existing process ponds and ADR plant in Section 8*.

   Eliminating the Section 30 Heap Leach solution ponds and piping the process fluids to the existing ponds in Section 17 was not considered a viable alternative. The risk of a solution release, and hence the risk of impacts to surface and groundwater, would be increased by pumping over long distances. The extra power costs for pumping would rapidly offset any construction savings especially due to the need to pump upgradient in Section 20. If scheduling dictated that both heaps had to be operated concurrently, the solution ponds would have insufficient capacity to contain solution from both facilities. In addition, the disturbance for the construction of the passive drain down facilities would still be required.

6) *Using the existing or authorized tailings impoundments as alternatives to leach fields or evaporation basins for long-term heap leach drain down solutions*.

   The Proposed Action includes a change in the heap leach closure procedures for the existing and proposed heap leach facilities at the Glamis Marigold Mine. A component of the proposed modified closure is to use the existing process ponds as ET basins if long-term drain down effluent requires passive treatment to address water quality issues. The existing and authorized tailings impoundments were considered for use in

lieu of the process ponds. This alternative was eliminated from further detailed analysis due to the current remediation and closure activities at the existing tailings impoundment and the unlikely need to construct the authorized tailings impoundment at this time.

2.7 Summary Comparison of the Proposed Action, Alternative 1, Alternative 2, and Alternative 3

Table 2-12 summarizes and compares the various components and disturbance associated with the Proposed Action, Alternative 1 – Trout Creek Diversion Realignment, Alternative 2 – Red Rock Pit Stabilization, and Alternative 3 - No Action Alternative. Detailed descriptions of impacts are contained in Chapter 3.0. The summary provided in Table 2-12 includes the implementation of mitigation measures presented as part of the resource discussions in Chapter 3.0.

2.8 Agency Preferred Alternative

In accordance with the NEPA, Federal agencies are required by the CEQ (40 FR 1502.14) to identify their preferred alternative for a project in the Draft SEIS, if a preference has been identified, and in the Final SEIS prepared for the project. The preferred alternative is not a final agency decision; it is rather an indication of the agency's preliminary preference. The alternative identified below is the BLM's preferred alternative at the Draft SEIS stage in the environmental review process. This preference may be changed based on the agency and public comments that are received on this Draft SEIS. The BLM's preference at this time considers all information that has been received and reviewed relevant to the proposed project. The agency preferred alternative is Alternative 2 as described in this Draft SEIS with all appropriate mitigation.

Table 2-12: Comparison of the Proposed Action, Alternative 1, Alternative 2, and Alternative 3

Project Component	Millennium Expansion Project Proposed Surface Disturbance (acres)		Alternative 1 – Trout Creek Diversion Realignment (acres)		Alternative 2 – Expanded Red Rock Pit Stabilization (acres)		Alternative 3 - No Action Alternative (Previously Authorized Surface Disturbance) (acres)	
	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land
Open Pit Mines								
8-South Pit	0	0	0	0	0	0	110	14
East Hill Pit	0	0	0	0	0	0	55	90
Top Zone Pit	see Terry Zone	see Terry Zone	see Terry Zone	see Terry Zone	see Terry Zone	see Terry Zone	65	34
Red Rock Pit	see Terry Zone	see Terry Zone	see Terry Zone	see Terry Zone	see Terry Zone	see Terry Zone	21	44
Old Marigold Pit	0	0	0	0	0	0	24	0
5-North Pit	0		0		0	0	0	29
8-North Pit	0	0	0	0	0	0	49	0
Terry Zone Pit Consolidation (Top Zone & Red Rock Deepening)	0	0	0	0	0	0	N/A	N/A
Section 30 - Target 1	19	0	19	0	19	0	N/A	N/A
Section 30 - Target 2	90	35	90	35	90	35	N/A	N/A
Section 31 - Antler Pit	34	43	34	43	34	43	N/A	N/A
Section 31 - Basalt Pit	21	153	21	153	21	153	N/A	N/A
Mackay Pit	0	19	0	19	0	19	N/A	N/A
Total Pits	164	250	164	250	164	250	324	211
Waste Rock Storage Areas								
8-South[(1)]	0	0	0	0	0	0	30	0
Top Zone	0	0	0	0	0	0	80	55
Old Marigold	9	7	9	7	9	7	73	23
Resort	0	0	0	0	0	0	10	163
5-North	0	0	0	0	0	0	0	55

Project Component	Millennium Expansion Project Proposed Surface Disturbance (acres)		Alternative 1 – Trout Creek Diversion Realignment (acres)		Alternative 2 – Expanded Red Rock Pit Stabilization (acres)		Alternative 3 - No Action Alternative (Previously Authorized Surface Disturbance) (acres)	
	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land
North Storage Area	155	133	155	133	155	133	N/A	N/A
South Storage Area	53	0	53	0	53	0	N/A	N/A
West Storage Area	11	133	11	133	11	133	N/A	N/A
Total Waste Rock Areas	228	273	228	273	228	273	193	296
Heap Leach Facilities								
Heap Leach Pads No. 1 - 10	0	0	0	0	0	0	56	74
Process Ponds	0	0	0	0	0	0	5	0
Storm water Ponds	0	0	0	0	0	0	1.5	1.5
SW Pad Expansion[(2)](Cell 11)	0	0	0	0	0	76	0	60
Process Ponds	0	0	0	0	0	2	0	0
Storm water Ponds	0	0	0	0	0	1	0	2
5-North Heap Leach Pad	0	0	0	0	0	0	0	30
Process Ponds	0	0	0	0	0	0	0	2
Storm water Ponds	0	0	0	0	0	0	0	1
Plant Facilities	0	0	0	0	0	0	0	1
Section 17 Leach Pad (Cell 12)	78	0	78	0	78	0	0	0
Solution Conveyance Ditch	0	2	0	2	0	2	0	0
Process Ponds	0	0	0	0	0	0	0	0
Storm water Pond	0	0	0	0	0	0	0	0
Carbon columns & storage tanks	0	0	0	0	0	0	0	0
Section 30 Heap Leach Pad	125	30	125	30	125	30	N/A	N/A
Process Ponds	14	2	14	2	14	2	N/A	N/A
Storm water Pond (free board on Process Ponds)	0	0	0	0	0	0	N/A	N/A
ADR, lime silo, & infill (includes fresh water pond)	24	0	24	0	24	0	N/A	N/A
Section 16 Heap Leach Pad	76	0	76	0	0	0	N/A	N/A
Process Ponds	2	0	2	0	0	0	N/A	N/A

Project Component	Millennium Expansion Project Proposed Surface Disturbance (acres)		Alternative 1 – Trout Creek Diversion Realignment (acres)		Alternative 2 – Expanded Red Rock Pit Stabilization (acres)		Alternative 3 - No Action Alternative (Previously Authorized Surface Disturbance) (acres)	
	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land
Storm water Pond	1	0	1	0	0	0	N/A	N/A
Carbon columns & storage tanks	1	0	1	0	0	0	N/A	N/A
Total Heap Leach	321	34	321	34	321	34	62.5	171.5
Plant and Support Facilities New Support Facility								
Existing Mill and Plant Facilities	0	0	0	0	0	0	35	17
New Truck shop, warehouse, fuel dispensing	0	7	0	7	0	7	N/A	N/A
Total Plant and Support Facilities	0	7	0	7	0	7	35	17
Tailings Disposal Facilities								
Existing Tailings Facility	0	0	0	0	0	0	0	234
New Tailings Facility	0	0	0	0	0	0	N/A	N/A
Total Tailings	0	0	0	0	0	0	0	234
Growth Media Stockpiles								
Pre-FEIS	0	0	0	0	0	0	5	15
5-North (2 stockpiles)	0	0	0	0	0	0	0	10
8-North	0	0	0	0	0	0	5	0
New Tailings	0	0	0	0	0	0	0	8
SW Heap Leach Pad	0	0	0	0	5	0	0	5
Section 19	0	5	0	5	0	5	N/A	N/A
Section 16	5	0	5	0	0	0	N/A	N/A
Total Growth Media	5	5	5	5	5	5	10	38
Surface Water Diversion Structures								
Heap Leach - Old Tailings	0	0	0	0	0	0	0.1	2.9
5-North/Cottonwood Creek	0	0	0	0	0	0	4	6
8-North/Trout Creek	0	0	0	0	0	0	5	3
SW Heap Leach	0	0	0	0	0	0	5	8

Project Component	Millennium Expansion Project Proposed Surface Disturbance (acres)		Alternative 1 – Trout Creek Diversion Realignment (acres)		Alternative 2 – Expanded Red Rock Pit Stabilization (acres)		Alternative 3 - No Action Alternative (Previously Authorized Surface Disturbance) (acres)	
	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land
New Trout Creek Diversion	0	0	5	7	0	0	0	0
New storm water diversion structures[3]	0	0	0	0	0	0	N/A	N/A
Total Diversion Structures	0	0	5	7	0	0	14.1	19.9
Haul and Access Roads								
Pre-FEIS Haul Roads	N/A	N/A	N/A	N/A	N/A	N/A	22	38
5 North	0	0	0	0	0	0	14	14
Millennium Expansion Project Haul and Access Roads	27	25	27	25	27	25	N/A	N/A
Total Haul and Access Roads	27	25	27	25	27	25	36	52
Water Supply Facilities								
Pre-FEIS Water Supply	N/A	N/A	N/A	N/A	N/A	N/A	4	5
Lone Tree Water Line	N/A	N/A	N/A	N/A	N/A	N/A	0.1	3.9
Millennium Expansion Project Water Supply	11	10	11	10	11	10	N/A	N/A
Total Water Supply	11	10	11	10	11	10	4.1	8.9
Infill Surface Disturbance								
Infill Areas[2]	0	0	0	0	0	0	50	10
Millennium Expansion Project Infill Areas	51	63	51	63	51	63	N/A	N/A
Total Infill Disturbance Areas	51	63	51	63	51	63	50	10
Miscellaneous Ancillary								
Miscellaneous and Ancillary Facilities	0	0	0	0	0	0	1.5	0.5
Total Ancillary Facilities	0	0	0	0	0	0	1.5	0.5
Surface Exploration								

Project Component	Millennium Expansion Project Proposed Surface Disturbance (acres)		Alternative 1 – Trout Creek Diversion Realignment (acres)		Alternative 2 – Expanded Red Rock Pit Stabilization (acres)		Alternative 3 - No Action Alternative (Previously Authorized Surface Disturbance) (acres)	
	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land	Public Land	Private Land
Drill roads, pads, trenches	N/A	N/A	N/A	N/A	N/A	N/A	17	25
Millennium Expansion Project Surface Exploration	0	0	0	0	0	0	N/A	N/A
Total Surface Exploration	0	0	0	0	0	0	17	25
Disturbance by Land Status	807	667	812	674	807	667	747.2	1,083.9
Disturbance Total	1,474		1,486		1,474		1,831.1	

Notes: [1]The total authorized disturbance does not include the 150 acres of reclaimed and recently released acres at the 8-South Waste Rock Storage Area.
[2]The acres shown for previously authorized disturbance for the Southwest Leach Pad and the infill areas reflect the changes authorized in the March 2002 Minor Modification DNA to eliminate 12 acres of disturbance on private land from the authorized infill disturbance, and to reconfigure the layout of the Southwest Heap Leach Pad to cover an additional 12 acres of private land.
[3]Surface disturbance for Millennium Expansion Project storm water diversion structures is accounted for in the acres shown for the Millennium Expansion Project pits and waste rock storage facilities.

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